

DESCRIPTION

Title of Invention: TEMPERATURE OUTPUT APPARATUS, AIR-
CONDITIONING SYSTEM, TEMPERATURE OUTPUT METHOD, AND
5 CONTROL METHOD OF AIR-CONDITIONING SYSTEM

Technical field

[0001] The present invention relates to a temperature output apparatus that
outputs temperatures of virtual areas of an air-conditioned space, an air-
10 conditioning system that performs air conditioning on the air-conditioned space,
and the like.

Background Art

[0002] A single air-conditioned space is usually air-conditioned to have a uniform
15 temperature. In order to promote energy savings in such air conditioning, an air
curtain is provided at an opening to the outside, and an air-conditioning system
is controlled such that inflow of air from the opening is reduced (for example, see
Patent Document 1).

20 Citation List

Patent Document

[0003]

Patent Document 1: JP 2020-115053A

25 Summary of Invention

Problem To be Solved by the Invention

[0004] The temperature that feels comfortable varies from person to person.

Therefore, there may be cases where, for example, if an air-conditioned space is adjusted to a uniform temperature, one person feels comfortable while another

5 does not. On the other hand, even if the air-conditioned space includes regions having different temperatures, a person in the air-conditioned space cannot move to a region having a temperature that feels comfortable unless he or she is aware of the temperature differences.

[0005] The present invention has been made in order to solve the

10 aforementioned problem, and an object of the present invention is to provide a temperature output apparatus and the like that enable the temperatures of virtual areas in a single air-conditioned space to be recognized.

Means for Solving the Problems

15 [0006] In order to achieve the above object, an aspect of the present invention is directed to a temperature output apparatus including: a temperature acquisition unit configured to acquire an area temperature for each of M (M is an integer of two or greater) areas obtained by virtually dividing a single air-conditioned space; and an output unit configured to output the area temperatures.

20 With such a configuration, the temperatures of the virtual areas of the air-conditioned space can be recognized. Therefore, an occupant of the air-conditioned space can move to an area having a temperature with which he or she feels comfortable.

[0007] Furthermore, an aspect of the present invention may be directed to the

25 temperature output apparatus, wherein the output unit outputs the area

temperatures using colors of lighting of areas corresponding to the area temperatures.

With such a configuration, an occupant of the air-conditioned space can recognize the temperature of each area based on the color of lighting.

5 [0008] Furthermore, an aspect of the present invention may be directed to the temperature output apparatus, wherein the output unit outputs the area temperatures sound sounds in areas corresponding to the area temperatures.

With such a configuration, an occupant of the air-conditioned space can recognize the temperature of each area based on the output sound.

10 [0009] Furthermore, an aspect of the present invention is directed to an air-conditioning system including: the temperature output apparatus; an air conditioner configured to adjust a temperature of air; a supply unit configured to supply, to the air-conditioned space, air whose temperature was adjusted by the air conditioner; and a control unit configured to control the supply unit using the
15 area temperatures such that the air-conditioned space has a desired temperature.

With such a configuration, for example, in a case where the areas have different temperatures due to air conditioning performed by the air conditioner, the temperatures of the areas can be recognized.

20 [0010] Furthermore, an aspect of the present invention may be directed to the air-conditioning system, wherein the air-conditioned space is virtually divided into N (N is an integer greater than or equal to M) sections, each of the areas is made up of one, two, or more sections, the supply unit includes multiple section supply units configured to independently supply, to the respective N sections, air
25 whose temperature was adjusted by the air conditioner, and the control unit

controls the multiple section supply units such that each of the M area temperatures becomes a different temperature.

With such a configuration, it is possible to perform air conditioning such that the temperature of each area is different.

5 [0011] Furthermore, an aspect of the present invention may be directed to the air-conditioning system, wherein the control unit sets the target temperatures of the areas such that heat transfer between adjacent areas is reduced.

With such a configuration, it is possible to perform efficient air-conditioning, that is, energy-saving air-conditioning.

10 [0012] Furthermore, an aspect of the present invention may be directed to the air-conditioning system, wherein the temperature acquisition unit is further configured to acquire a perimeter temperature that is a temperature of a perimeter of the air-conditioned space, and the control unit sets the target temperatures of the areas such that a temperature difference between the target
15 temperature of an area having the perimeter and the perimeter temperature of the perimeter is reduced.

With such a configuration, target temperatures can be set in consideration of the temperature of the perimeter. It is possible to promote energy savings by setting target temperatures such that, for example, a target
20 temperature of an area facing a west perimeter is higher and a target temperature of an area facing an east perimeter is lower in the evening.

[0013] Furthermore, an aspect of the present invention may be directed to the air-conditioning system further including a number-of-occupants acquisition unit configured to acquire a total number of occupants in the air-conditioned space,
25 wherein, if the number of occupants acquired by the number-of-occupants

acquisition unit is smaller than a threshold, the control unit reduces a size of an area with a target temperature for which an air conditioning load is highest.

With such a configuration, if the number of occupants in the air-conditioned space is small, it is possible to perform air conditioning with a smaller load, that is, energy-saving air conditioning.

[0014] Furthermore, an aspect of the present invention may be directed to the air-conditioning system further including: a number-of-occupants acquisition unit configured to acquire, for each of the areas, a total number of occupants in the area of the air-conditioned space; and an occupant density acquisition unit configured to acquire, for each of the areas, an occupant density of the area using the number of occupants in the area acquired by the number-of-occupants acquisition unit, wherein the control unit enlarges an area in which the occupant density acquired by the occupant density acquisition unit is higher than a threshold.

With such a configuration, it is possible to prevent the occupant density of an area with a certain target temperature from increasing. As a result, it is possible to improve the comfort level in the air-conditioned space.

[0015] Furthermore, an aspect of the present invention is directed to a temperature output method including: a step of acquiring an area temperature for each of M (M is an integer of two or greater) areas obtained by virtually dividing a single air-conditioned space; and a step of outputting the area temperatures.

[0016] Furthermore, an aspect of the present invention is directed to a control method of an air-conditioning system that includes an air conditioner configured to adjust a temperature of air and a supply unit configured to supply, to an air-

conditioned space, air whose temperature was adjusted by the air conditioner, the method including: a step of acquiring an area temperature for each of M (M is an integer of two or greater) areas obtained by virtually dividing a single air-conditioned space; a step of outputting the area temperatures; and a step of
5 controlling the supply unit such that the air-conditioned space has a desired temperature.

Effect of the Invention

[0017] With a temperature output apparatus and the like according to an aspect
10 of the present invention, it is possible to recognize the temperatures of virtual areas in a single air-conditioned space.

Brief Description of the Drawings

[0018] FIG. 1 is a schematic diagram showing a configuration of an air-
15 conditioning system according to an embodiment of the present invention.

FIG. 2 is a block diagram showing functions of the air-conditioning system according to the embodiment.

FIG. 3A is a plan view showing an example of sections and areas in an air-conditioned space according to the embodiment.

20 FIG. 3B is a plan view showing an example of the sections and areas in the air-conditioned space according to the embodiment.

FIG. 3C is a plan view showing an example of the sections and areas in the air-conditioned space according to the embodiment.

25 FIG. 3D is a plan view showing an example of the sections and areas in the air-conditioned space according to the embodiment.

FIG. 4 is a flowchart showing the operation of the air-conditioning system according to the embodiment.

Description of Embodiments

[0019] An air-conditioning system, a temperature output apparatus, a control method of the air-conditioning system, and a temperature output method according to the present invention will be described below using an embodiment. Note that, in the following embodiment, constituent elements and steps assigned the same reference numerals are identical or correspond to each other, and a redundant description thereof may be omitted. In the air-conditioning system according to the present embodiment, the temperatures of multiple areas obtained by virtually dividing a single air-conditioned space are output, and control is performed such that each area has a different temperature.

[0020] FIG. 1 is a schematic diagram showing a configuration of an air-conditioning system 1 according to the present embodiment, and FIG. 2 is a block diagram showing functions of the air-conditioning system 1. FIGS. 3A to 3D are plan views of an air-conditioned space 50. Note that FIG. 1 mainly shows components related to a flow of conditioned air, and FIG. 2 mainly shows components related to control. The air-conditioned space 50 is a space to be air-conditioned by the air-conditioning system 1. The single air-conditioned space 50 is not particularly limited, but may be, for example, a large-scale space such as a waiting area at an airport, a hospital, or the like.

[0021] The single air-conditioned space 50 is virtually divided into N sections. One, two, or more sections make up one area. Therefore, the single air-

conditioned space 50 may be virtually divided into M areas. As will be described

later, when control is performed such that a different target temperature is set for each area, one area may be considered to be a region corresponding to one target temperature. M is an integer of two or greater, and N is an integer greater than or equal to M ($N \geq M$). Note that, when an area is enlarged or reduced, N may be an integer greater than M ($N > M$). The number of sections and the number of areas are not particularly limited, but, in the present embodiment, a case will be mainly described in which the air-conditioned space 50 has five sections 51a to 51e and three areas 53a to 53c, that is, $N = 5$ and $M = 3$ as shown in FIGS. 1 and 3A to 3D. Note that, when the sections 51a to 51e are not particularly distinguished, they may also be referred to as sections 51. The same applies to the areas 53a to 53c and other components. Although the sections 51 and areas 53 are virtual, the numbers of sections and areas, that is, N and M may be fixed, as an example.

[0022] In FIGS. 1 and 3A to 3D, the boundaries between the sections 51 are indicated by dashed lines. In addition, in FIGS. 3A to 3D, the areas 53 are indicated by one-dot chain lines. Note that, since the boundaries between the sections 51 and the boundaries between the areas 53 are virtual, no structures separating the spaces, such as walls or partitions, are present at the positions in the real space that correspond to the boundaries of the sections 51 and the boundaries of the area 53 in the air-conditioned space 50. The sections 51 and the areas 53 are usually adjacent in horizontal directions. In addition, the temperatures shown in FIGS. 3A to 3D are target temperatures of the areas 53.

[0023] A perimeter may be present in the portion of the air-conditioned space 50 that is in contact with the outside air. In the present embodiment, a case will be mainly described in which there are perimeters 52a and 52b along two opposing

wall surfaces of the air-conditioned space 50 as shown in FIGS. 1 and 3A to 3D.

Note that, in the present embodiment, as an example, a case will be described in which the perimeters 52a and 52b are on the east and west sides of the air-conditioned space 50, respectively, but the number and positions of perimeters 52 are not limited. As an example, the perimeters 52 may be windows. The regions of the air-conditioned space 50 that are in contact with the perimeters 52 are easily affected by the outside air and sunlight.

[0024] The air-conditioning system 1 according to the present embodiment includes a temperature output apparatus 10, an air conditioner 21, a supply unit 22, a number-of-occupants acquisition unit 24, an occupant density acquisition unit 25, and a control unit 26. The temperature output apparatus 10 includes a temperature acquisition unit 11 and an output unit 12. The supply unit 22 includes section supply units 23a to 23e.

[0025] The temperature acquisition unit 11 acquires an area temperature for each of the areas 53. Note that the temperature acquisition unit 11 may acquire the temperatures of the sections 51 in order to acquire the area temperatures of the areas 53. The temperatures of the sections 51 may be acquired by temperature sensors 61a to 61e disposed respectively in the sections 51, and be passed to the temperature acquisition unit 11. Note that the temperature of each section 51 may be a representative value of the temperatures at multiple positions in the section 51. In addition, the area temperature of a certain area 53 may be a representative value of the temperatures of one or more sections 51 included in the area 53. The representative value may be, for example, an average value or a median.

[0026] The temperature acquisition unit 11 may also acquire perimeter

temperatures that are the temperatures of the perimeters 52 of the air-conditioned space 50. The perimeter temperatures may be temperatures measured by temperature sensors 62a and 62b in perimeter zones in the vicinity of the perimeters 52. The temperatures measured by the temperature sensors 61 and 62 may be passed to the temperature acquisition unit 11 in a wired or wireless manner. Note that the temperature acquisition unit 11 may or may not include, for example, the temperature sensors 61 and 62.

[0027] Note that, as will be described later, when an area 53 is enlarged or reduced, the temperature acquisition unit 11 may change the temperatures of the sections used to acquire the area temperature, in accordance with the expansion or reduction of the area 53. For example, when an area 53a is made up of sections 51a and 51b, the area temperature of the area 53a may be a representative value of the temperatures of the sections 51a and 51b. In addition, for example, when the area 53a is reduced to include only the section 51a, the area temperature of the area 53a may be the temperature of the section 51a. The temperature acquisition unit 11 may acquire the area temperature of each area 53 using the area-section correspondence relationship indicated by correspondence information that associates each area identifier that identifies an area with section identifiers that identify sections included in the area. The correspondence information may, for example, be managed by the control unit 26.

[0028] The output unit 12 outputs area temperatures. As an example, the output unit 12 may output the area temperature of a certain area 53, in that area 53. Specifically, the output unit 12 may output an area temperature using a color of lighting in an area 53 corresponding to the area temperature, may output an area temperature using a sound in an area 53 corresponding to the area

temperature, or may display an area temperature in an area 53 corresponding to the area temperature. An area 53 corresponding to an area temperature is the area 53 where measurement related to the area temperature was performed.

When an area temperature is output in an area 53 in this manner, an output

5 device (for example, a lighting, speaker, or display device) may be disposed in each section 51, and the area temperature may be output via the output device.

In addition, for example, when one area 53 includes two or more sections 51, the area temperature may be output in the two or more sections 51. When an area temperature is indicated by a color of lighting, for example, color-changeable

10 lightings 63a to 63e may be disposed in the respective sections 51 as shown in

FIG. 1. Note that, for example, these lightings that indicate area temperatures using colors may also serve as lightings for brightening the areas 53, or may be used to indicate area temperatures separately from lightings for brightening the areas 53. When an area temperature is indicated by a sound, for example, a

15 speaker or the like that can output a sound may be disposed in each section 51.

When an area temperature is displayed, for example, a display device such as a display may be disposed in each section 51.

[0029] When an area temperature is output using a color of lighting, for

example, a lower area temperature may be output using a color that is perceived
20 as cooler, that is to say, a color of lighting having a higher color temperature (for example, a cool color), and a higher area temperature may be output using a color that is perceived as warmer, that is to say, a color of lighting having a lower color temperature (for example, a warm color). When an area temperature is output in this manner, it suffices for people who feel comfortable with a lower

25 temperature to move to an area 53 where the color of the lighting feels cooler, and

for people who feel comfortable with a higher temperature to move to an area 53 where the color of the lighting feels warmer.

[0030] When an area temperature is output using a sound, a lower area temperature may be output using a sound that feels cooler, for example, an

5 environmental sound such as the sound of a babbling river, waves, or a wind chime, and a higher area temperature may be output using a sound that feels warmer, for example, an environmental sound such as the sound of a bonfire.

When an area temperature is output in this manner, it suffices for people who feel comfortable with a lower temperature to move to an area 53 where the sound
10 feels cooler, and for people who feel comfortable with a higher temperature to move to an area 53 where the sound feels warmer. Note that an area temperature may be output as voice reading out the area temperature, for example.

[0031] When an area temperatures is displayed, an area temperature such as

15 “26°C” may be displayed on a display device such as a digital signage disposed in each area 53. When an area temperature is displayed in this manner, it suffices for people who feel comfortable with a lower temperature to move to an area 53 where a lower temperature is displayed, and for people who feel comfortable with a higher temperature to move to an area 53 where a higher temperature is
20 displayed.

[0032] Note that the output unit 12 may, for example, transmit display content indicating the area temperatures of the respective areas 53 to the information processing terminals (for example, smartphones and tablet terminals) of the occupants in the air-conditioned space 50. The area temperatures of the

25 respective areas 53 may then be displayed on the information processing

terminals. In addition, as long as the area temperature of each area 53 is recognized by the occupants in that area 53 as a result, the method for outputting the area temperatures is not limited. In addition, as will be described later, when an area 53 is enlarged or reduced, the output unit 12 may accordingly
5 change the area 53 in which an area temperature is to be output. For example, if the area 53a is made up of the sections 51a and 51b, the area temperature of the area 53a may be output in the sections 51a and 51b. In addition, for example, when the area 53a is reduced to include only the section 51a, the area temperature of the area 53a may be output only in the section 51a. For
10 example, the output unit 12 may output an area temperature in an area 53 corresponding to the area temperature, using the area-section correspondence relationship indicated by correspondence information that associates each area identifier that identifies an area with section identifiers that identify sections included in the area. The correspondence information may be, for example,
15 managed by the control unit 26.

[0033] In addition, the output unit 12 may perform, for example, output for indicating the value of an area temperature. For example, when the area temperature of a certain area 53 is 26°C, the output unit 12 may perform control such that the lighting 63 of that area 53 has a color corresponding to 26°C, may
20 output a voice reading “26°C” from the speaker of that area 53, or may display a character string indicating “26°C” on the display device disposed in that area 53. When lighting is performed in accordance with a temperature in this manner, for example, a configuration may be adopted in which a correspondence relationship between each area temperature and a corresponding color is determined in
25 advance and the output unit 12 determines the color of the lighting 63 in

accordance with the correspondence relationship.

[0034] In addition, the output unit 12 may perform, for example, output for allowing the relative temperatures of the areas 53 to be recognized. For example, if the area temperature of the area 53a is 24°C, the area temperature of the area 53b is 26°C, and the area temperature of the area 53c is 28°C, the output unit 12 may perform control such that the lighting 63 of the area 53a emits blue light corresponding to a lower temperature, perform control such that the lighting 63 of the area 53b emits white light corresponding to a medium temperature, and perform control such that the lighting 63 of the area 53c emits red light corresponding to a higher temperature, may output the sound of a babbling river corresponding to a lower temperature from the speaker of the area 53a, output the sound of birds chirping corresponding to an medium temperature from the speaker of the area 53b, and output the sound of a bonfire corresponding to a higher temperature from the speaker of the area 53c, or may display a video image of drifting ice corresponding to a lower temperature on the display device in the area 53a, display a video image of a park corresponding to an medium temperature on the display device in area 53b, and display a video image of a desert corresponding to a higher temperature on the display device in area 53c.

[0035] When performing output for allowing relative temperatures of the areas 53 to be recognized, the output unit 12 may, for example, convert the area temperature of each area 53 into a relative temperature and, in the area 53, perform output corresponding to the relative temperature. The relative temperature may, for example, be a high temperature, a medium temperature, or a low temperature. For example, if there are M areas 53, the output unit 12 may convert the area temperatures into relative temperatures such as a high

temperature, a medium temperature, and the like in descending order of area temperature. In addition, a configuration may be adopted in which the M relative temperatures may each be associated with output content in advance, which is used by the output unit 12 to perform output corresponding to the
5 relative temperature of the area temperature of a certain area 53.

[0036] Here, output that is performed by the output unit 12 may be, for example, lighting performed by a lighting device, sound output by a speaker, display on a display device (for example, a liquid crystal display or an organic EL display), or transmission to a predetermined device via a communication line. Note that the
10 output unit 12 may or may not include a device that performs output (for example, a speaker or a display device). In addition, the output unit 12 may be realized by hardware devices, or may be realized by software such as a driver that drives those devices.

[0037] The air conditioner 21 adjusts the temperature of air. This air

15 conditioning may use cold water or hot water supplied from a heat source device 20 having a boiler or a refrigerator. The air conditioner 21 may also adjust humidity, and ventilate or purify air, for example. Air conditioned by the air conditioner 21 is supplied to the supply unit 22 via a duct. In the present embodiment, a case will be mainly described in which air conditioning is
20 performed by a central air supply system, but it goes without saying that air conditioning may also be performed by other systems such as a central water-air-combined supply system or water supply system, or a decentralized refrigerant supply system.

[0038] The supply unit 22 supplies air whose temperature was adjusted by the

25 air conditioner 21 to the air-conditioned space 50. In the present embodiment, a

case will be mainly described in which the supply unit 22 includes section supply units 23a to 23e that independently supply, to the respective sections 51, air whose temperature was adjusted by the air conditioner 21, as shown in FIG. 1.

The section supply units 23 may supply air whose temperature was adjusted and

5 that has been supplied from the air conditioner 21 via a duct, to the sections 51

with a variable air volume. The section supply unit 23 may each be, for

example, a variable air volume (VAV) device, a blower that can adjust an air

volume through inverter control or the like, or a combination thereof, or may

have another configuration that can adjust an air volume. In the present

10 embodiment, a case will be mainly described in which the section supply units 23

are variable air volume devices. Note that supply ports (air outlets) for air from

the section supply units 23 may be provided, for example, in the ceiling of the air-conditioned space 50 as shown in FIG. 1, or may be provided at other locations.

In addition, the supply port of each section 51 is preferably located at a position

15 from which conditioned air is supplied to the entire section 51. For example, the supply port may be provided at or in the vicinity of the center or the centroid of the section 51 in a plan view.

[0039] Note that, although not shown in FIG. 1, there may be a configuration for discharging or circulating air in the air-conditioned space 50. For example, air

20 may be taken in through an intake port provided in the air-conditioned space 50

and then discharged or recirculated to the air conditioner 21. The intake port

may or may not be provided, for example, for each section 51. As an example, a portion of air from the intake port may be discharged and another portion may be recirculated.

25 [0040] The number-of-occupants acquisition unit 24 acquires the number of

occupants in the air-conditioned space 50. For example, the number-of-occupants acquisition unit 24 may acquire the number of occupants in the air-conditioned space 50 for each area 53. When the occupant density acquisition unit 25 acquires the occupant density for each area 53, the number-of-occupants acquisition unit 24 preferably acquires the number of occupants for each area 53. Note that, in order to acquire the total number of occupants in the air-conditioned space 50 or the number of occupants for each area 53, the number-of-occupants acquisition unit 24 may, for example, acquire the number of occupants for each section 51 and use the acquired number of occupants for each section 51 to acquire the number of occupants for each area 53 or the total number of occupants in the air-conditioned space 50. More specifically, the number-of-occupants acquisition unit 24 may acquire the number of occupants in an area 53 by totaling the numbers of occupants in the sections 51 that make up the area 53, or may acquire the total number of occupants in the air-conditioned space 50 by totaling the numbers of occupants in all of the sections 51. In the present embodiment, such a case will be mainly described.

[0041] A method by which the number-of-occupants acquisition unit 24 acquires the number of occupants in the air-conditioned space 50, the number of occupants in each area 53, or the number of occupants in each section 51 is not limited.

For example, the number of occupants in the air-conditioned space 50, the number of occupants in each area 53, or the number of occupants in each section 51 may be acquired using an image captured by a camera 64. FIG. 1 shows only a single camera 64 as an example, but, for example, one or more cameras 64 may be used to acquire the number of occupants in the air-conditioned space 50, the number of occupants in each area 53, or the number of occupants in each section

51. If a captured image is used to acquire the number of occupants, for example, the number of occupants in the air-conditioned space 50, the number of occupants in each area 53, or the number of occupants in each section 51 may be acquired by detecting occupants in the captured image and counting the detected

5 occupants.

[0042] Note that the number-of-occupants acquisition unit 24 may use other methods to acquire the number of occupants in the air-conditioned space 50. For example, the number-of-occupants acquisition unit 24 may use a MAC (Media Access Control) address included in a wireless signal transmitted from a mobile
10 terminal such as a smartphone to acquire the number of occupants in the air-conditioned space 50, or the number of occupants for each area 53 or each section 51.

[0043] The occupant density acquisition unit 25 acquires the occupant density for each area 53 using the number of occupants for each area 53 acquired by the
15 number-of-occupants acquisition unit 24. The occupant density acquisition unit 25 may, for example, hold the surface areas of the sections 51 and calculate the surface area of each area 53 using the held surface areas of the sections 51. The occupant density acquisition unit 25 may then calculate the occupant density of each area 53 by dividing the number of occupants in the area 53 acquired by the
20 number-of-occupants acquisition unit 24 by the area of the area 53, for example.

[0044] The control unit 26 uses the area temperatures acquired by the temperature acquisition unit 11, to control the supply unit 22 such that a desired temperature is achieved in the air-conditioned space 50. More specifically, the control unit 26 may control the section supply units 23 such that each of the area
25 temperatures is different. For example, the control unit 26 may control the

section supply units 23 that supply conditioned air to the areas 53, such that the area temperature of each of the areas 53 reaches a target temperature. For example, the target temperature of each area 53 may be different. As shown in FIG. 3A, as an example, if the target temperatures of the areas 53a to 53c are set to 28°C, 26°C, and 24°C, respectively, the control unit 26 may control the section supply units 23a and 23b of the sections 51a and 51b that make up the area 53a such that the area temperature of the area 53a reaches the target temperature of 28°C. Similar control may be performed for the other areas 53b and 53c. In addition, if an area 53 is changed or the target temperature of the area 53 is changed, air conditioning control is performed in accordance with such a change using the changed area 53 or target temperature. This control may be, for example, feedback control.

[0045] In addition, the control unit 26 may also set, for example, the target temperatures of the areas 53. The control unit 26 may set the target

temperatures of the areas 53 such that heat transfer between adjacent areas 53 is reduced. In this manner, more energy-saving air conditioning can be achieved. For example, if the surface areas of the boundaries between the areas 53 are the same as shown in FIG. 3A and the like, the control unit 26 may set the target temperatures of the areas 53 such that the total of the area temperature differences between adjacent areas 53 is reduced. On the other hand, if the surface areas of the boundaries between the areas 53 are different, the control unit 26 may set target temperatures of the areas 53 such that the total sum of the results of respectively multiplying the temperature differences between the area temperatures of adjacent areas 53 by values corresponding to the areas of the boundaries is reduced. A value corresponding to the surface area of a

boundary may be, for example, a value obtained by multiplying the surface area of the boundary by a predetermined positive coefficient. Note that the temperature difference between areas 53 may be a real number greater than or equal to 0. That is to say, when calculating a temperature difference, the absolute value of a result of subtracting one temperature from the other temperature may be calculated.

[0046] Note that the M target temperatures to be assigned to the M areas 53 may be determined in advance. For example, in a case where cooling is performed and there are three areas 53 in the air-conditioned space 50, three target temperatures to be assigned to the three areas 53 may be determined as 28°C, 26°C, and 24°C in advance. The control unit 26 may then set target temperatures of the area 53 by assigning the M predetermined target temperatures to the M areas 53, respectively.

[0047] For example, when the areas 53 are arranged in a row as shown in FIG.

3A, the control unit 26 may set target temperatures so as to increase or decrease along the row. As an example, as shown in FIG. 3A, the control unit 26 may set the target temperatures of the areas 53a to 53c to 28°C, 26°C, and 24°C, respectively. By setting the target temperatures in this manner, the total of temperature differences between the area temperatures of adjacent areas 53 becomes smaller, and heat transfer between the adjacent areas 53 can be reduced, for example, compared to a case where the target temperatures of the areas 53a to 53c are set to 28°C, 24°C, and 26°C, respectively. On the other hand, if the areas 53 are arranged in a more complex manner, the control unit 26 may calculate, for each assignment result of assigning target temperatures to the respective areas 53, the total sum of values obtained by multiplying each

temperature difference between the area temperatures of adjacent areas 53 by a value corresponding to the surface area of the boundary between the areas 53, and set target temperatures of the areas 53 in accordance with the target temperature assignment corresponding to the smallest total sum. Note that, when there are M areas 53, it is possible to perform assignment of target temperatures in M factorial (M!) patterns. Therefore, the control unit 26 may, for example, calculate M! total sums and set the target temperatures of the areas 53 in accordance with the target temperature assignment corresponding to the smallest total sum is performed.

[0048] Note that, if there are multiple assignment patterns of target temperatures that result in reduced heat transfer between adjacent areas 53, the control unit 26, for example, may set target temperatures in correspondence with one randomly selected assignment pattern, or may select one of the assignment patterns of target temperatures in consideration of the perimeter temperatures and the like and set target temperatures in correspondence with the selected assignment pattern. Setting target temperatures in consideration of the perimeter temperatures will be described below.

[0049] In addition, for example, if the number of occupants in the air-conditioned space 50 acquired by the number-of-occupants acquisition unit 24 is less than a threshold, the control unit 26 may reduce the area 53 with a target temperature for which the air conditioning load is highest. This makes it possible to reduce the overall air-conditioning load, and promote energy savings. Note that the target temperature for which the air-conditioning load is, for example, highest may be the lowest target temperature when cooling is being performed and the highest target temperature when heating is being performed. The threshold

may be determined in advance. For example, this threshold may be set to a value that is small enough to indicate that the air-conditioned space 50 is only sparsely populated.

[0050] Note that, if the area 53 with the target temperature for which the air conditioning load is highest includes only one section 51, the area 53 does not need to be reduced. In addition, if the area 53 with the area temperature for which the air conditioning load is highest includes three or more sections 51, for example, the area 53 may be reduced such that the number of sections 51 included in the reduced area 53 is one, or the area 53 may be reduced such that the number of sections 51 included in the area 53 is reduced by one. Also, when the area 53 with the target temperature for which the air conditioning load is highest is reduced, for example, an adjacent area 53 may be enlarged accordingly, or the area 53 with the target temperature for which the air conditioning load is lowest may be enlarged. The target temperature for which the air conditioning load is lowest may be, for example, the highest target temperature when cooling is performed, and the lowest target temperature when heating is being performed. As an example, in a situation where target temperatures are set as shown in FIG. 3A, if the number of occupants in the air-conditioned space 50 acquired by the number-of-occupants acquisition unit 24 is less than a threshold, the control unit 26 may reduce the area 53c with the target temperature of 24°C for which the air conditioning load is highest, and accordingly enlarge the area 53b that is adjacent to the area 53c, and whose target temperature is 26°C, as shown in FIG. 3B.

[0051] In addition, the control unit 26 may set a target temperature for each area 53 such that the temperature difference between the target temperature of

an area 53 having a perimeter 52 and the perimeter temperature of the perimeter 52 is smaller. The perimeter temperature may be acquired by the temperature acquisition unit 11. This enables more energy-saving air conditioning to be realized. For example, due to the influence of solar radiation, the perimeter temperature of the perimeter 52a on the east side may be higher in the morning, and the perimeter temperature of the perimeter 52b on the west side may be higher in the evening. Therefore, more energy-saving air conditioning can be realized by setting the target temperature of the area 53 on the east side to be higher in the morning and the target temperature of the area 53 on the west side to be higher in the evening, in accordance with the perimeter temperatures.

[0052] For example, the control unit 26 may set target temperatures of the areas 53 such that heat transfer between adjacent areas 53 is reduced and such that the temperature difference between the target temperature of each area 53 having a perimeter 52 and the perimeter temperature of the perimeter 52 is reduced. For example, when the areas 53 are arranged in a row as shown in FIG. 3A, and the target temperatures are set so as to increase or decrease along the row, the control unit 26 may use the perimeter temperatures to determine whether the target temperatures are arranged in descending or ascending order from the eastern area 53 toward the western area 53. More specifically, the control unit 26 may set the target temperatures of the areas 53 such that the order of the target temperatures corresponds to the smaller of the total of the temperature difference between the perimeter temperature measured by the temperature sensor 62a and the area temperature of the area 53a and the temperature difference between the perimeter temperature measured by the

temperature sensor 62b and the area temperature of the area 53c, in a case where the target temperatures are arranged in descending order from the east side area 53 toward the west side area 53; and the total of the temperature difference between the perimeter temperature measured by the temperature sensor 62a and the area temperature of the area 53a and the temperature difference between the perimeter temperature measured by the temperature sensor 62b and the area temperature of the area 53c, in a case where the target temperatures are arranged in ascending order from the east side area 53 toward the west side area 53. For example, the control unit 26 may set the target temperature of the area 53a having the perimeter 52a on the east side to be higher in the morning as shown in FIG. 3A, and set the target temperature of the area 53c having the perimeter 52b on the west side to be higher in the evening as shown in FIG. 3C.

[0053] In addition, the control unit 26 may enlarge, for example, an area 53 whose occupant density acquired by the occupant density acquisition unit 25 is higher than a threshold. This threshold is different from the threshold used to reduce an area 53 with the target temperature for which the air conditioning load is highest. This can prevent people from congregating in a specific area 53, and, for example, improve the comfort level in the air-conditioned space 50. Note that, when an area 53 whose occupant density is higher than the threshold is enlarged, an adjacent area 53 may be reduced accordingly, for example. In addition, if an area 53 adjacent to an area 53 to be enlarged includes only one section 51, for example, the area 53 adjacent to the area 53 to be enlarged may be moved, to reduce an area 53 including two or more sections 51. As an example, in a situation where the target temperatures are set as shown in FIG. 3A, when

the occupant density of the area 53b acquired by the occupant density acquisition unit 25 exceeds the threshold, the control unit 26 may enlarge the area 53b whose occupant density is higher than the threshold, and accordingly reduce the areas 53a and 53c adjacent to the area 53b, as shown in FIG. 3D. Note that,

5 when each of the areas 53 other than the area 53 whose occupant density is higher than the threshold includes only one section 51, the area 53 whose occupant density is higher than the threshold does not need to be enlarged.

[0054] Target temperatures may be set in accordance with the perimeter temperatures, and an area 53 may be enlarged and reduced while air

10 conditioning is being performed. This makes it possible to achieve suitable air conditioning in response to changes in the perimeter temperatures, changes in the number of occupants in the air-conditioned space 50, and changes in the occupant density of each area 53.

[0055] Next, the operation of the air-conditioning system 1 will be described with
15 reference to the flowchart in FIG. 4.

(step S101) The control unit 26 sets target temperatures of the areas 53.

Note that, for example, the areas 53 in the air-conditioned space 50 may be determined in advance. The target temperatures of the areas 53, for example, may be set to predetermined initial values, or may be set such that heat transfer
20 between adjacent areas 53 is reduced.

[0056] (step S102) The temperature acquisition unit 11 judge whether or not to acquire the area temperatures and the like. If the area temperatures and the like are to be acquired, the procedure advances to step S103; otherwise, the procedure advances to step S106. Note that, for example, the temperature

25 acquisition unit 11 may periodically judge that the area temperatures and the

like are to be acquired.

[0057] (step S103) The temperature acquisition unit 11 acquires the area temperatures and the perimeter temperatures using the temperatures measured by the temperature sensors 61a to 61e and the temperature sensors 62a and 62b.

5 The acquired area temperatures and the like may be stored in a recording medium (not shown).

[0058] (step S104) The output unit 12 outputs the acquired area temperatures.

[0059] (step S105) The control unit 26 controls the section supply unit 23 of each area 53 such that the area temperature of the area 53 reaches the target

10 temperature. The procedure then returns to step S102.

[0060] (step S106) The control unit 26 judges whether or not to enlarge or reduce an area or change a target temperature. If an area is to be enlarged or reduced or a target temperature is to be changed, the procedure advances to step S107; otherwise, the procedure returns to step S102. Note that the control unit 26

15 may periodically judge that an area is to be enlarged or reduced or a target temperature is to be changed. In addition, for example, the frequency with which it is judged in step S102 that area temperatures or the like are to be

acquired may be higher than the frequency with which it is judged in step S106 that an area is to be enlarged, reduced, or the like. For example, it may be

20 judged to be “Yes” every minute or every 10 minutes in step S102, and it may be judged to be “Yes” every 30 minutes or every hour in step S106.

[0061] (step S107) The number-of-occupants acquisition unit 24 acquires the numbers of occupants in the areas 53 in the air-conditioned space 50. Also, the number-of-occupants acquisition unit 24 may acquire the number of occupants in

25 the air-conditioned space 50 by totaling the numbers of occupants in the areas 53.

[0062] (step S108) The occupant density acquisition unit 25 acquires the occupant density of each area 53 using the number of occupants in the area 53.

[0063] (step S109) The control unit 26 judges whether or not the number of occupants in the air-conditioned space 50 is less than a predetermined threshold.

5 If the number of occupants in the air-conditioned space 50 is less than the predetermined threshold, the procedure advances to step S110; otherwise, the procedure advances to step S111.

[0064] (step S110) The control unit 26 reduces the area 53 with the target temperature for which the air conditioning load is highest. The procedure then

10 returns to step S102.

[0065] (step S111) The control unit 26 judges whether or not there is an area 53 whose occupant density is higher than a predetermined threshold. If there is an area 53 whose occupant density is higher than the predetermined threshold, the procedure advances to step S112; otherwise, the procedure advances to step S113.

15 [0066] (step S112) The control unit 26 enlarges the area 53 whose occupant density is higher than the predetermined threshold. The procedure then returns to step S102.

[0067] (step S113) The control unit 26 judges whether or not it is necessary to change the setting of the target temperatures of the areas 53. If it is necessary

20 to change the setting of the target temperatures, the procedure advances to step S114; otherwise, the procedure returns to step S102. Note that the control unit

26 may judge that the setting of the target temperatures is to be changed if, for example, there is another target temperature setting that can reduce the temperature difference between the target temperature of an area 53 having a

25 perimeter 52 and the perimeter temperature of the perimeter 52, compared to the

current target temperature setting. As the perimeter temperature, the last acquired perimeter temperature, in other words, the most recent perimeter temperature may be used.

[0068] (step S114) The control unit 26 sets the target temperatures of the areas

5 53 such that the temperature difference between the target temperature of an area 53 having a perimeter 52 and the perimeter temperature of the perimeter 52 is reduced. The procedure then returns to step S102.

[0069] Note that, although not included in the flowchart in FIG. 4, cold or hot water is supplied from the heat source device 20 to the air conditioner 21, and the

10 air conditioner 21 may use the cold or hot water to provide air at a predetermined temperature. The processing order in the flowchart in FIG. 4 is merely an

example, and the order of the steps may be changed as long as similar results are obtained. For example, the occupant density acquisition processing in step S108 may be performed immediately before the judgment processing in step S111 is

15 performed. In the flowchart in FIG. 4, if it is judged in step S106 that the area is to be enlarged, reduced, or the like, the processing of only one of steps S110, S112, and S114 is performed, but this is not necessarily the case. A

configuration may be adopted in which the processing of two or more of steps

S110, S112, and S114 can be performed. In this case, for example, the procedure

20 may advance from step S110 to step S111, and from step S112 to step S113.

Note that, in the flowchart in FIG. 4, the processing ends due to an interruption, such as a power-off or termination of the processing.

[0070] Next, the operation of the air-conditioning system 1 according to the present embodiment will be described using a specific example.

25 First, when control of the air-conditioning system 1 is started, the control

unit 26 sets the target temperatures of the areas 53 as determined in advance (step S101). In this specific example, it is assumed that the target temperatures of the areas 53 are set as shown in FIG. 3A.

[0071] Next, when it is time to acquire temperatures, the temperature

5 acquisition unit 11 acquires the temperatures measured by the temperature sensors 61a to 61e, uses the acquired temperatures to acquire area temperatures, and passes the acquired area temperatures to the output unit 12 and the control unit 26. The temperature acquisition unit 11 also acquires the perimeter temperatures measured by the temperature sensors 62a and 62b and passes the

10 perimeter temperatures to the control unit 26 (steps S102 and S103). Upon receiving the area temperatures, the output unit 12 outputs the area temperatures in the respective areas 53 (step S104). For example, the area temperatures may be output using the colors of the lightings 63. By the area temperatures being output, the occupants in the air-conditioned space 50 can

15 recognize the current temperatures in the areas 53 and move to an area 53 where they feel comfortable. In addition, upon receiving the area temperatures, the control unit 26 controls the section supply units 23 such that the area temperature of each area 53 reaches the target temperature of that area 53 (step S105). Due to the acquisition of the area temperatures and control of the section

20 supply unit 23 of the areas 53, the area temperatures of the areas 53 approach the respective target temperatures.

[0072] In addition, when it is time to enlarge or reduce areas or change target temperatures, the number-of-occupants acquisition unit 24 acquires the number of occupants in each area 53 in the air-conditioned space 50 and the number of

25 occupants in the air-conditioned space 50, and passes the number of occupants in

each area 53 to the occupant density acquisition unit 25 and the number of occupants in the air-conditioned space 50 to the control unit 26 (steps S106 and S107). Upon receiving the number of occupants in each area 53, the occupant density acquisition unit 25 uses it to acquire the occupant density of the area 53 and passes the acquired occupant density to the control unit 26 (step S108).

[0073] Upon receiving the number of occupants in the space 50 and the occupant density, the control unit 26 judges whether or not the number of occupants in the air-conditioned space 50 is smaller than a predetermined threshold (step S109).

In this case, it is assumed that the number of occupants in the air-conditioned

space 50 is not smaller than the predetermined threshold. The control unit 26 then judges whether or not there is an area 53 whose occupant density is higher than a predetermined threshold (step S111). In this case, it is assumed that

there is no area 53 whose occupant density is higher than the predetermined threshold. The control unit 26 then judges whether or not it is necessary to

change the setting of the target temperatures of the areas 53 (step S113). For example, the control unit 26 may compare the total of the temperature

differences between the current perimeter temperatures and the target

temperatures of the areas 53 having the perimeters 52 with the total of the

temperature differences that would be obtained if the target temperatures of the

areas 53 were changed, and judge that the setting of the target temperatures of the areas 53 needs to be changed if the latter total of the temperature differences is smaller. It is assumed, in this case, that the latter total of the temperature

differences is smaller. The control unit 26 then changes the target temperatures such that the target temperatures decrease from the area 53c on the perimeter

52b side toward the area 53a on the perimeter 52a side (step S114). As a result,

for example, the target temperatures may be changed as shown in FIG. 3C.

This change makes it possible to select appropriate target temperatures in response to, for example, the influence of solar radiation, and promote energy savings.

5 [0074] Note that, when the target temperatures are set as shown in FIG. 3A, and the number of occupants in the air-conditioned space 50 falls below the predetermined threshold, the control unit 26 may, for example, reduce the area 53c where the air conditioning load is highest, in other words, the area 53c where the target temperature while cooling is conducted is lowest, as shown in FIG. 3B
10 (step S110).

[0075] In addition, when the target temperatures are set as shown in FIG. 3A, and the occupant density of the area 53b exceeds a predetermined threshold, the control unit 26 may, for example, enlarge the area 53b whose occupant density is higher than the predetermined threshold, as shown in FIG. 3D (step S112).

15 [0076] As described above, with the air-conditioning system 1 according to the present embodiment, it is possible to perform air conditioning such that the areas 53 have different temperatures. In addition, by the area temperatures of the areas 53 being output, the occupants in the air-conditioned space 50 can recognize the temperatures of the areas 53. Therefore, the occupants in the air-
20 conditioned space 50 can move to and stay in an area 53 having a temperature with which they feel comfortable. In addition, by setting the target temperatures of the areas 53 such that heat transfer between adjacent areas 53 is reduced, energy-saving air conditioning can be performed. In addition, by setting the target temperatures of the areas 53 such that the temperature
25 difference between the target temperature of an area 53 having a perimeter 52

and the perimeter temperature of that perimeter 52 is reduced, it is possible to further promote energy savings. In addition, when the number of occupants in the air-conditioned space 50 is small, more energy-saving air conditioning can be performed by reducing the area 53 with the target temperature for which the air-conditioning load is highest. Also, by enlarging the area 53 whose the occupant density is higher than the threshold, it is possible to prevent the occupant density of an area 53 with a specific target temperature from being high, and make the occupant densities of the areas 53 in the air-conditioned space 50 more uniform.

[0077] Note that, in the present embodiment, a case has been mainly described in which an area 53 is enlarged in accordance with the occupant density, but this is not necessarily the case. Enlargement of an area 53 in accordance with the occupant density is not necessary. In this case, the air-conditioning system 1 does not need to include the occupant density acquisition unit 25, and the number-of-occupants acquisition unit 24 does not need to acquire the number of occupants for each area.

[0078] In addition, in the present embodiment, a case has been mainly described where an area 53 is reduced in accordance with the number of occupants in the air-conditioned space 50, but this is not necessarily the case. Reduction of an area 53 in accordance with the number of occupants in the air-conditioned space 50 is not necessary. If no area 53 is reduced in accordance with the number of occupants in the air-conditioned space 50 and no area 53 is enlarged in accordance with the occupant density, the air-conditioning system 1 does not need to include the number-of-occupants acquisition unit 24. Also, if the areas 53 are not enlarged or reduced, the area 53 may coincide with sections 51.

[0079] In addition, in the present embodiment, a case has been mainly described

where target temperatures are set in consideration of the perimeter temperatures of the perimeters 52, but this is not necessarily the case. Setting the target temperatures in consideration of the perimeter temperatures is not necessary. In this case, the temperature acquisition unit 11 does not need to
5 acquire perimeter temperatures.

[0080] In addition, in the present embodiment, a case has been mainly described where control is performed to ensure that the area temperatures of the areas 53 are different, but this is not necessarily the case. For example, in a case where the areas 53a to 53c are arranged as shown in FIG. 3A, conditioned air may be
10 supplied only to area 53a, and air may be taken in to be discharged or recirculated only from the area 53c. In this case, a natural temperature gradient is formed from the area 53a toward the area 53c. Therefore, in such a situation, the occupants in the air-conditioned space 50 may refer to the area temperatures output by the output unit 12 and move to an area 53 where they
15 feel comfortable. In this manner, if active control is not performed to ensure that the area temperatures of the areas 53 are different, the supply unit 22 does not need to include the section supply units 23 for the respective sections. In this case, the supply unit 22 may, for example, supply conditioned air to at least one of the areas 53 of the air-conditioned space 50. The supply unit 22 may also
20 have a variable air volume device and the like, similarly to the supply units 23. In addition, the areas 53 are preferably set to have different temperatures by being supplied with conditioned air from the supply unit 22.

[0081] In addition, in the present embodiment, a case has been mainly described where the air-conditioning system 1 includes the temperature output apparatus
25 10, but this is not necessarily the case. The temperature output apparatus 10

may be used independently. For example, when an air-conditioning system conditions an air-conditioned space, the area temperatures of areas included in the air-conditioned space may be different. For example, such a situation may occur if the air-conditioning system does not have sufficient capacity for the air-
5 conditioned space. By the temperature output apparatus 10 acquiring and outputting the area temperatures of the areas, the area temperatures of the areas can be visualized or made apparent, and the occupants in the air-conditioned space can refer to the output area temperatures and move to an area having a temperature with which they feel comfortable. Note that it is
10 preferable that the areas 53 are set to have different temperatures.

[0082] In addition, in the above embodiment, each processing or function may be realized through centralized processing performed by a single device or a single system, or may be realized through distributed processing performed by multiple apparatuses or multiple systems.

15 [0083] In addition, in the above embodiment, for example, the transfer of information between two physically different constituent elements may be performed by one of the constituent elements outputting the information and the other constituent element receiving the information, or the transfer of information between two physically identical constituent elements may be
20 performed through transition from a processing phase corresponding to one of the constituent elements to a processing phase corresponding to the other constituent element.

[0084] In addition, in the above embodiment, information related to processing performed by each constituent element, for example, information accepted,
25 acquired, selected, generated, transmitted, or received by each constituent

element, and information such as thresholds, formulas, and addresses used in processing by each constituent element, may be stored in a recording medium (not shown) temporarily or for a long period, even if not explicitly stated above.

In addition, the storage of information in the recording medium (not shown) may be performed by each constituent element or a storage unit (not shown). In addition, the reading of information from the recording medium (not shown) may be performed by each constituent element or a reading unit (not shown).

[0085] In addition, in the above embodiment, if information used by each constituent element or the like, for example, information such as thresholds,

addresses, and various setting values used in processing by each constituent element, may be changed by the user, the user may be able to change such information as appropriate even if not explicitly stated in the above description, but this is not necessarily the case. If the information can be changed by the user, the change may be realized, for example, by an acceptance unit (not shown) that accepts a change instruction from the user and a changing unit (not shown) that changes the information in accordance with the change instruction. The acceptance of the change instruction by the acceptance unit (not shown) may be acceptance from an input device, may be receiving of information transmitted via a communication line, or may be acceptance of information read from a predetermined recording medium.

[0086] In addition, in the above embodiment, in a case where two or more constituent elements included in the air-conditioning system 1 or the temperature output apparatus 10 include a communication device, an input device, or the like, the two or more constituent elements may physically include a single device, or may include separate devices.

[0087] In addition, in the above embodiment, each constituent element may be configured by dedicated hardware, or a constituent element that can be realized by software may be realized by executing a program. For example, a constituent element that can be realized by software may be realized by a program execution unit such as a CPU reading and executing a software program recorded on a recording medium such as a hard disk or a semiconductor memory. During execution, the program execution unit may execute the program while accessing a storage unit or recording medium. The program may also be executed by being downloaded from a server or the like, or may be stored in a predetermined recording medium (for example, an optical disk, a magnetic disk, or a semiconductor memory) and executed by being read out therefrom. The program may also be used as a program constituting a program product. In addition, the program may be executed by a single computer or multiple computers. That is, centralized processing or distributed processing may be performed.

[0088] In addition, the above embodiments are examples for specifically implementing the present invention and do not limit the technical scope of the present invention. The technical scope of the present invention is indicated by the claims, not by the description of the embodiments, and is intended to include modifications within the literal scope and equivalent meaning of the claims.

CLAIMS

[Claim 1] A temperature output apparatus comprising:

a temperature acquisition unit configured to acquire an area temperature
5 for each of M (M is an integer of two or greater) areas obtained by virtually
dividing a single air-conditioned space; and
an output unit configured to output the area temperatures using colors of
lighting of areas corresponding to the area temperatures,
wherein the output unit outputs a lower area temperature using a color of
10 lighting having a higher color temperature, and outputs a higher area
temperature using a color of lighting having a lower color temperature.

[Claim 2] A temperature output apparatus comprising:

a temperature acquisition unit configured to acquire an area temperature
15 for each of M (M is an integer of two or greater) areas obtained by virtually
dividing a single air-conditioned space; and
an output unit configured to output the area temperatures using sounds
in areas corresponding to the area temperatures,
wherein the output unit outputs a lower area temperature using an
20 environmental sound that feels cooler, and outputs a higher area temperature
using an environmental sound that feels warmer.

[Claim 3] An air-conditioning system comprising:

a temperature acquisition unit configured to acquire an area temperature
25 for each of M (M is an integer of two or greater) areas obtained by virtually

dividing a single air-conditioned space;

an output unit configured to output the area temperatures;

an air conditioner configured to adjust a temperature of air;

a supply unit configured to supply, to the air-conditioned space, air whose

5 temperature was adjusted by the air conditioner; and

a control unit configured to control the supply unit using the area
temperatures such that the air-conditioned space has a desired temperature,

wherein the air-conditioned space is virtually divided into N (N is an
integer greater than or equal to M) sections,

10 each of the areas is made up of one, two, or more sections,

the supply unit includes multiple section supply units configured to
independently supply, to the respective N sections, air whose temperature was
adjusted by the air conditioner, and

the control unit controls the multiple section supply units such that each
15 of the M area temperatures becomes a different target temperature.

[Claim 4] The air-conditioning system according to claim 3,

wherein the control unit sets the target temperatures of the areas such
that heat transfer between adjacent areas is reduced.

20

[Claim 5] The air-conditioning system according to claim 3,

wherein the temperature acquisition unit is further configured to acquire
a perimeter temperature that is a temperature of a perimeter of the air-
conditioned space, and

25 the control unit sets the target temperatures of the areas such that a

temperature difference between the target temperature of an area having the perimeter and the perimeter temperature of the perimeter is reduced.

[Claim 6] The air-conditioning system according to claim 3, further

5 comprising:

a number-of-occupants acquisition unit configured to acquire a total number of occupants in the air-conditioned space,

wherein, if the number of occupants acquired by the number-of-occupants acquisition unit is smaller than a threshold, the control unit reduces a size of an
10 area with a target temperature for which an air conditioning load is highest.

[Claim 7] The air-conditioning system according to claim 3, further

comprising:

a number-of-occupants acquisition unit configured to acquire, for each of
15 the areas, a total number of occupants in the area of the air-conditioned space;
and

an occupant density acquisition unit configured to acquire, for each of the areas, an occupant density of the area using the number of occupants in the area acquired by the number-of-occupants acquisition unit,

20 wherein the control unit enlarges an area in which the occupant density acquired by the occupant density acquisition unit is higher than a threshold.

[Claim 8] A temperature output method comprising:

a step of acquiring an area temperature for each of M (M is an integer of
25 two or greater) areas obtained by virtually dividing a single air-conditioned

space; and

a step of outputting the area temperatures using colors of lighting of areas corresponding to the area temperatures,

wherein, in the step of outputting the area temperatures, a lower area temperature is output using a color of lighting having a higher color temperature, and a higher area temperature is output using a color of lighting having a lower color temperature.

[Claim 9] A temperature output method comprising:

a step of acquiring an area temperature for each of M (M is an integer of two or greater) areas obtained by virtually dividing a single air-conditioned space; and

a step of outputting the area temperatures using sounds in areas corresponding to the area temperatures,

wherein, in the step of outputting the area temperatures, a lower area temperature is output using an environmental sound that feels cooler, and a higher area temperature is output using an environmental sound that feels warmer.

[Claim 10] A control method of an air-conditioning system that includes an air conditioner configured to adjust a temperature of air and a supply unit configured to supply, to an air-conditioned space, air whose temperature was adjusted by the air conditioner, the method comprising:

a step of acquiring an area temperature for each of M (M is an integer of two or greater) areas obtained by virtually dividing a single air-conditioned

space;

a step of outputting the area temperatures; and

a step of controlling the supply unit using the area temperatures such that the air-conditioned space has a desired temperature,

5 wherein the air-conditioned space is virtually divided into N (N is an integer greater than or equal to M) sections,

each of the areas is made up of one, two, or more sections,

the supply unit includes multiple section supply units configured to independently supply, to the respective N sections, air whose temperature was

10 adjusted by the air conditioner, and

in the step of controlling the supply unit, the multiple section supply units are controlled such that each of the M area temperatures becomes a different target temperature.