

[DESCRIPTION]

[Title of Invention] CONTROL SYSTEM AND CONTROL METHOD

[Technical Field]

[0001]

5 The present invention relates to a control system and a control method.

[Background Art]

[0002]

10 Conventionally, a technique has been proposed for performing comfortable air conditioning by measuring the temperature distribution in a room and the position information of a person in the room. For example, Patent Literature (PTL) 1 discloses a technique for performing comfortable air conditioning control by detecting the position of a person in a room and controlling the temperature and
15 airflow in the room according to the position of the person.

[Citation List]

[Patent Literature]

[0003]

[PTL 1] Japanese Patent No. 5175562

20 [Summary of Invention]

[Technical Problem]

[0004]

25 However, it is difficult to say that the conventional technique described in PTL 1 performs comfortable air conditioning control according to a person.

[0005]

 The present invention provides a control system and a control method capable of performing comfortable air conditioning control according to a person.

30 [Solution to Problem]

[0006]

 A control system according to one aspect of the present invention includes: a plurality of blowers which blow air toward a plurality of positions aligned in a horizontal direction, the plurality of

positions corresponding to the plurality of blowers; a detector which detects a user who is present in a direction to which the air is blown; a deriving unit which derives a horizontal width of the user with respect to the plurality of blowers based on a result of detection from the detector; a determiner which determines a blowing mode at each of both ends and a center of the horizontal width of the user derived, based on the horizontal width of the user; and a controller which controls an operation of each of the plurality of blowers based on the blowing mode determined.

10 [0007]

A control method according to one aspect of the present invention is a method of controlling a blowing device which includes a plurality of blowers which blow air toward a plurality of positions aligned in a horizontal direction and corresponding to the plurality of blowers. The control method includes: detecting a user who is present in a direction to which the air is blown from the blowing device; deriving a horizontal width of the user with respect to the plurality of blowers based on a result of detection obtained in the detecting; determining a blowing mode at each of both ends and a center of the horizontal width of the user derived in the deriving, based on the horizontal width of the user; and controlling an operation of each of the plurality of blowers based on the blowing mode determined.

[0008]

25 A program according to one aspect of the present invention is a program for causing a computer to perform the control method.

[Advantageous Effects of Invention]

[0009]

According to the present invention, it is possible to provide a control system and a control method capable of performing comfortable air conditioning control according to a person.

[Brief Description of Drawings]

[0010]

[FIG. 1]

FIG. 1 illustrates an outline of a control system according to an embodiment.

[FIG. 2]

FIG. 2 is a block diagram illustrating an example of a functional configuration of the control system according to the embodiment.

[FIG. 3]

FIG. 3 illustrates an example of a configuration of a blowing device according to the embodiment.

10 [FIG. 4]

FIG. 4 is a flowchart of operation example 1 of the control system according to the embodiment.

[FIG. 5]

FIG. 5 illustrates examples of blowing control performed based on a width of a user.

[FIG. 6]

FIG. 6 is a flowchart of operation example 2 of the control system according to the embodiment.

[FIG. 7]

20 FIG. 7 is a flowchart of operation example 3 of the control system according to the embodiment.

[FIG. 8]

FIG. 8 is a flowchart of operation example 4 of the control system according to the embodiment.

25 [FIG. 9]

FIG. 9 is a graph illustrating the results of Experimental Example 1.

[FIG. 10]

FIG. 10 is a graph illustrating the results of Experimental Example 2.

[FIG. 11]

FIG. 11 is a graph illustrating the results of Experimental Example 3.

[Description of Embodiment]

[0011]

Hereinafter, an embodiment will be specifically described with reference to the drawings. It should be noted that the embodiment described below shows general or specific examples. Numerical values, shapes, materials, structural elements, arrangement positions and connection forms of the structural elements, steps, order of steps, etc. illustrated in the following embodiment are examples, and are not intended to limit the present invention. Moreover, among the structural elements in the following embodiment, the structural elements not described in the independent claims will be described as arbitrary structural elements.

[0012]

Note that each figure is a schematic diagram, and is not necessarily exactly illustrated. In the figures, the structural elements that are essentially the same share like reference signs. Accordingly, duplicate description is omitted or simplified.

[0013]

[Embodiment]

[1. Outline]

First, an outline of a control system according to an embodiment will be described. FIG. 1 illustrates an outline of a control system according to an embodiment.

[0014]

Control system 500 according to the embodiment is a system for controlling blowing device 200 based on the width of a user. As illustrated in FIG. 1, control system 500 may also control home devices, such as lighting device 310 and audio device 320 in addition to blowing device 200 provided in the space where user 1 is present, based on the information input by user 1 using user terminal device 400 (for example, the thermal sensation and the mood desired by user 1).

[0015]

The width of user 1 is derived from the result of detection from

detector 30 such as a camera. Control system 500 determines the blowing mode at each of both ends and the center of the width of user 1, and controls blowing from blowing device 200 based on the determined blowing mode. Moreover, for example, control system 500 may change the blowing mode based on the information related to the thermal sensation desired by user 1 and input by user 1 using user terminal device 400 such as a smartphone. Moreover, for example, control system 500 may control not only blowing from blowing device 200, but also the operations of other devices, such as lighting device 310 and audio device 320, provided in the room (hereinafter, also referred to as home devices) based on the information related to the mood desired by user 1. Examples of a specific control will be described later.

[0016]

The width of user 1 is the horizontal width of user 1 with respect to a plurality of blowers (for example, first blower 240a, second blower 240b, third blower 240c (see FIG. 3)) included in blowing device 200. More specifically, the width of user 1 is the width of user 1 in the arrangement direction of the blowers (first blower 240a, second blower 240b, third blower 240c) included in blowing device 200. For example, when user 1 faces blowing device 200, the width of user 1 is the shoulder width of user 1, and when user 1 faces sideways with respect to blowing device 200, the width of user 1 is the thickness of the body of user 1. FIG. 1 illustrates an example in which blowing device 200 is provided on the floor surface, but the present invention is not limited to such an example. For example, blowing device 200 may be provided on the ceiling. In this case, the horizontal width of user 1 with respect to blowing device 200 is the horizontal width of user 1 as seen from the ceiling, and more specifically, is the width of user 1 in the arrangement direction of the blowers (first blower 240a, second blower 240b, third blower 240c) included in blowing device 200 provided on the ceiling.

[0017]

[2. Functional Configuration]

Next, a functional configuration of control system 500 will be described with reference to FIG. 2 in addition to FIG. 1. FIG. 2 is a block diagram illustrating an example of the functional configuration of the control system according to the embodiment.

5 [0018]

As illustrated in FIG. 1 and FIG. 2, control system 500 according to the embodiment includes detector 30, control device 100, blowing device 200, home device 300, and user terminal device 400.

10 [0019]

[Detector and Temperature Sensor]

Detector 30 is a sensor which detects user 1. Detector 30 detects user 1 who is present in the direction in which the air is blown from blowing device 200. Detector 30 is, for example, a camera, and captures an image (specifically, a moving image) of user 1. The camera is realized by a complementary metal oxide semiconductor (CMOS) image sensor or a charge coupled device (CCD) image sensor. Detector 30 may be a ranging camera which captures a distance image, or may be an infrared sensor which detects the presence or absence of user 1 in a detection range. Detector 30 may be provided in the indoor space or may be incorporated in the blowing device.

[0020]

Temperature sensor 50 measures the temperature of the indoor space in which blowing device 200 is provided. Specifically, temperature sensor 50 senses the ambient temperature of user 1. Temperature sensor 50 outputs sensing data to control device 100. Temperature sensor 50 may be incorporated in blowing device 200 or may be provided in the indoor space. Moreover, one or more temperature sensors 50 may be provided. In this case, one temperature sensor 50 may be incorporated in blowing device 200, and remaining temperature sensors 50 may be mounted on the ceiling, wall, pillar, and the like of the indoor space. For example, the measured values of the temperatures obtained by temperature

sensors 50 are used for calculating the temperature distribution in the indoor space. Temperature sensor 50 may be realized by, for example, a temperature measuring element such as a thermistor or a thermocouple.

5 [0021]

Control system 500 may further include a humidity sensor (not illustrated) which senses the humidity of the ambient environment of the user. The humidity sensor outputs sensing data to control device 100. The humidity sensor may be incorporated in blowing device 200, may be incorporated in a humidifier (not illustrated) provided in the room, or may be provided in the indoor space. Moreover, the humidity sensor may be a temperature and humidity sensor in which a temperature sensor and a humidity sensor are integrated on one chip.

15 [0022]

[Control Device]

Control device 100 controls blowing device 200 based on the width of user 1 derived from the result of detection by detector 30. Control device 100 may further control blowing device 200 based on the measured value obtained by temperature sensor 50. Control device 100 may further control blowing device 200 based on the information related to the thermal sensation input by user 1. Control device 100 may be a local controller provided in or near the indoor space, or may be a circuit incorporated in blowing device 200. Control device 100 includes, for example, communicator 110, information processor 120, and storage 130.

[0023]

Communicator 110 is a communication module (communication circuit) for control device 100 to communicate with detector 30, temperature sensor 50, blowing device 200, home device 300, and user terminal device 400 via a local communication network. Communicator 110 obtains, for example, sensing data from each of detector 30 and temperature sensor 50. Communicator 110 also obtains the input information of user 1 from

user terminal device 400. The communication performed by communicator 110 may be wired communication or wireless communication. The communication standard used for communication is not particularly limited, either.

5 [0024]

Information processor 120 performs information processing for causing blowing device 200 to perform blowing control. Information processor 120 includes deriving unit 122, determiner 124, and controller 126. Information processor 120 is realized by,
10 for example, a processor, a microcomputer, or a dedicated circuit. Information processor 120 may be realized by a combination of two or more of a processor, a microcomputer, or a dedicated circuit.

[0025]

Based on the result of detection from detector 30, deriving
15 unit 122 derives the horizontal width of user 1 with respect to the blowers (for example, first blower 240a, second blower 240b, third blower 240c).

[0026]

Determiner 124 determines the blowing mode at each of both
20 ends and the center of the horizontal width of user 1 based on the width of user 1 derived by deriving unit 122. Examples of the blowing mode include a blowing speed, the volume of blown air, a blowing range, and periodic variations (so-called fluctuations) of these parameters.

25 [0027]

Controller 126 controls the operations of the respective
blowers of blowing device 200 based on the blowing modes determined by determiner 124. Specific examples of the blowing pattern achieved based on the blowing mode may include a blowing
30 pattern in which the volume of air at each of both ends of the width of user 1 is greater than the volume of air at the center of the width of user 1, or a blowing pattern in which the volume of air at the center of both ends of user 1 is less than the volume of air at the center of the width of user 1. Moreover, the blowing pattern may be

a blowing pattern in which the volume of air blown to the center of the width of user 1 fluctuates and the volume of air blown to both ends of the width of user 1 is maintained at a constant level. The blowing pattern is not limited to the above examples.

5 [0028]

The details of the functions of each unit of information processor 120 will be described through operation examples.

[0029]

Storage 130 is a storage device which stores sensing data
10 obtained by control device 100 from various sensors such as detector 30 and temperature sensor 50, and a computer program executed by information processor 120 (for example, an application program for controlling blowing device 200). Moreover, storage 130 may store, for example, a blowing mode database (not illustrated) and a control
15 pattern database (not illustrated). In the blowing mode database, the width of the user and the blowing mode at each of both ends and the center of the width of the user (hereinafter, simply referred to as the blowing mode) may be associated with each other. Moreover, in the control pattern database, the blowing mode, the distance from
20 each blower to the user, and the control pattern of each blower may be associated with one other. Moreover, storage 130 may store, in addition to the blowing mode database, a thermal sensation and blowing mode database (not illustrated) in which information related to the thermal sensation desired by the user and the blowing mode
25 are associated with each other. Moreover, the storage may store a mood and blowing mode database (not illustrated) in which information related to the mood desired by the user and the blowing mode are associated with each other. The thermal sensation and blowing mode database and mood and blowing mode database may
30 be combined into one database. Moreover, in the thermal sensation and blowing mode database and the mood and blowing mode database, the lighting mode and the audio mode may be stored. Storage 130 is realized by, for example, a semiconductor memory. Storage 130 may be a storage on a cloud server. When control

system 500 includes a humidification unit (not illustrated), the thermal sensation and blowing mode database and the mood and blowing mode database may store the humidification mode in addition to the lighting mode and the audio mode. Details of the lighting mode, the audio mode, and the humidification mode will be described later.

[0030]

[Blowing Device]

Blowing device 200 includes a plurality of blowers, and is capable of independently controlling the volume of air blown from each blower (that is, the volume of air), the speed of the air blown from each blower (that is, the air velocity), periodic fluctuations thereof and the like. Blowing device 200 includes, for example, communicator 210, controller 220, storage 230, first blower 240a, second blower 240b, and third blower 240c. As illustrated in FIG. 2, blowing device 200 may include, for example, temperature adjusters (for example, first temperature adjuster 250a, second temperature adjuster 250b, third temperature adjuster 250c) such as heat exchangers, so that the temperature of the air blown from blowing device 200 can be adjusted. In other words, blowing device 200 may have a temperature adjusting function (blowing function and air conditioning function). Hereinafter, a specific configuration of blowing device 200 will be described with reference to FIG. 3 in addition to FIG 2. FIG. 3 illustrates an example of a configuration of the blowing device according to the embodiment.

[0031]

As illustrated in FIG. 3, blowing device 200 includes housing 270, a plurality of blowers arranged on housing 270, and partition plate 280. In the example of FIG. 3, the blowers are first blower 240a, second blower 240b, and third blower 240c. Housing 270 houses high-pressure air adjusters 260a, 260b, 260c (hereinafter, 260a to 260c) corresponding to the blowers. High-pressure air adjusters 260a to 260c include: high-pressure air generators 261a, 261b, and 261c each including a suction port (not illustrated) for

taking in air from the outside of housing 270, an impeller (not illustrated) for generating high-pressure air, and a motor (not illustrated) for driving the impeller; the above-mentioned temperature adjuster (not illustrated in FIG. 3), and a nozzle (not illustrated) for delivering high-pressure air to an outlet. Partition plate 280 partitions a space which will be described later. Blowing device 200 may include partition plate 280 in a portion of the space, or does not have to include partition plate 280.

[0032]

Next, first blower 240a, second blower 240b, and third blower 240c will be described with reference to FIG. 2 and FIG. 3. First blower 240a, second blower 240b, and third blower 240c blow air toward three positions which are aligned in the horizontal direction and correspond to first blower 240a, second blower 240b, and third blower 240c. Here, an example is described in which blowing device 200 includes three blowers, but blowing device 200 is not limited to such an example. Blowing device 200 may include two blowers or four or more blowers. When blowing device 200 includes three blowers, for example, first blower 240a blows air to the right end of the width of user 1 (see FIG. 1) facing blowing device 200, and second blower 240b blows air to the center of the width of user 1, and third blower 240c blows air to the left end of the width of user 1. When blowing device 200 includes two blowers, for example, each blower blows air such that the air hits a range from one end to the center of the width of user 1.

[0033]

Next, a specific configuration of each blower will be described with reference to FIG. 3. First blower 240a includes nozzle 241a and nozzle 241b which are disposed with a space in between. Nozzle 241a includes one lateral face (here, the face on the front side of the drawing sheet) with outlet 242a for blowing high-pressure air, and nozzle 241b includes one lateral face with outlet 242b for blowing high-pressure air. The one lateral faces of nozzle 241a and nozzle 241b are flush with each other. Each of second blower 240b and

third blower 240c has a same configuration as that of first blower 240a. Second blower 240b includes nozzle 241c and nozzle 241d which are disposed with a space in between. Nozzle 241c includes one lateral face with outlet 242c and nozzle 241d includes one lateral face with outlet 242d. The one lateral faces of nozzle 241c and nozzle 241d are flush with each other. Third blower 240c includes nozzle 241e and nozzle 241f which are disposed with a space in between. Nozzle 241e includes one lateral face with outlet 242e and nozzle 241f includes one lateral face with outlet 242f. The one lateral faces of nozzle 241e and nozzle 241f are flush with each other. In the example of FIG. 3, outlets 242a to 242f are formed on the one lateral faces in the same manner. However, for example, each of outlets 242a to 242f may include a plurality of outlets, such as an upper outlet and a lower outlet. The outlets of respective nozzles may have different sizes (here, in height). An air direction plate (not illustrated) for adjusting the air direction may be provided at each outlet. For example, blowing device 200 may control the directions of the air blown from the blowers by adjusting the direction of the high-pressure air blown from the outlets according to a control signal from control device 100. For example, when control device 100 determines the blowing mode based on the movement of user 1 from the result of detection from detector 30, blowing device 200 may perform blowing control according to the movement of user 1. Moreover, for example, when control device 100 determines the blowing mode that is based on the height of user 1 from the result of detection from detector 30, blowing device 200 may perform blowing control in the height direction of user 1 in addition to the blowing control in the width direction of user 1.

[0034]

First blower 240a, second blower 240b, and third blower 240c blow, toward the corresponding ones of the three positions aligned in the horizontal direction, the air drawn by the high-pressure air blown from outlets 242a to 242f to the space between two nozzles 241a and 241b, the space between two nozzles 241c and 241d, and the space

between two nozzles 241e and 241f. The operation of each of first blower 240a, second blower 240b, and third blower 240c is controlled by controller 220 based on a control signal from control device 100. For example, blowing device 200 may control the volume of air blown from first blower 240a by adjusting the volume of high-pressure air blown from outlets 242a and 242b of first blower 240a according to the control signal from control device 100. By controlling the volume of air blown from first blower 240a, the blowing mode (for example, air volume and air speed) at a portion (for example, the right end) of the width of user 1 corresponding to first blower 240a is adjusted.

[0035]

Although not illustrated, each of first blower 240a, second blower 240b, and third blower 240c may further include a humidification unit (not illustrated). This allows the humidity of the air blown from blowing device 200 to be adjusted. The humidification unit includes, for example, a water storage container for storing water and a filter for retaining water in the water storage container. The details of the operation of the humidification unit will be described through operation examples.

[0036]

Referring back to FIG. 2, communicator 210, controller 220, and storage 230 of blowing device 200 will be described.

[0037]

Communicator 210 is a communication circuit for blowing device 200 to communicate with control device 100. Communicator 210 may be, for example, a wireless communication circuit which performs wireless communication, or a wired communication circuit which performs wired communication. The communication standard for communication performed by communicator 210 is not particularly limited.

[0038]

Controller 220 performs information processing related to the control of blowing device 200. Controller 220 is realized by, for

example, a microcomputer, but may be realized by a processor or a dedicated circuit.

[0039]

5 Storage 230 is a storage device which stores, for example, a program executed by controller 220 (for example, an application program for controlling blowing device 200). Storage 230 is realized by, for example, a semiconductor memory.

[0040]

[Home Device]

10 Home device 300 is a device other than blowing device 200 provided in the indoor space, and is a device to be controlled by control device 100. As described above, the operation of home device 300, such as lighting device 310 and audio device 320, is controlled by control device 100 based on the information (for
15 example, the thermal sensation and mood desired by user 1) input by user 1 using user terminal device 400. More specifically, control device 100 controls the operation of home device 300 based on the mode (for example, a lighting mode or an audio mode) determined based on the above information. Home device 300 includes, for
20 example, a communication module (communication circuit) for communicating with control device 100, and operates according to a control signal received from control device 100. Examples of home device 300 include lighting device 310 and audio device 320.

[0041]

25 Lighting device 310 illuminates a room. More specifically, lighting device 310 receives, from control device 100, a control signal for controlling at least one of the chromaticity or the intensity of the light emitted from lighting unit 311, and illuminates the room according to the control signal. The control signal is generated
30 based on the lighting mode determined based on the information input by user 1 using user terminal device 400. Examples of the lighting mode include the color temperature or the numerical value of the output of the light emitted from lighting unit 311. Specific examples of the lighting pattern achieved based on the lighting mode

include a lighting pattern in which, when the position of user 1 is the center of the lighting region, the lighting is bright at the center and gradually becomes darker as the distance from the center to the outside decreases, or may be a lighting pattern in which the lighting is dark at the center and gradually becomes brighter as the distance from the center to the outside decreases. Moreover, the lighting pattern may be, for example, a lighting pattern in which the brightness is uniform over the entire lighting region, a lighting pattern in which the brightness of the entire lighting region gradually increases from a turn-off state, or a lighting pattern in which an overall brightness of the lighting region gradually decreases and turns off. The lighting pattern is not limited to the above examples. [0042]

Lighting device 310 is, for example, a ceiling light, but a specific embodiment of lighting device 310 is not particularly limited. Lighting device 310 may be a downlight, a pendant light, a spotlight, a bracket light, or the like. [0043]

Audio device 320 is a device which includes audio unit 321 such as a loudspeaker or earphones. Audio device 320 may reproduce sound into a predetermined space such as a room via a loudspeaker, or may reproduce sound via earphones worn by the user. Audio device 320 receives, from control device 100, a control signal for controlling at least one of the type, volume, or reproduction speed of the sound reproduced from audio unit 321, and reproduces sound according to the control signal. The control signal is generated based on the audio mode determined based on the information input by user 1 using user terminal device 400. Examples of the audio mode include the intensity, reproduction speed, and modulation of the sound reproduced from audio unit 321. Examples of the specific audio pattern achieved based on the audio mode include an audio pattern which reproduces sound according to a predetermined rhythm or tempo, an audio pattern which reproduces sound according to predetermined music, or an audio

pattern which reproduces natural sound such as bird's song or sound of stream. The audio pattern is not limited to the above examples.
[0044]

Home device 300 is not limited to the above examples. For
5 example, home device 300 may include a humidifier, an aroma diffuser, and the like.
[0045]

A humidifier is a device which includes a humidification unit which adjusts the humidity of the air in the indoor space. The
10 humidifier receives, from control device 100, a control signal which controls at least one of the volume, the discharge time, and the discharge frequency of humidified air discharged from the humidification unit, and adjusts the humidity of the air in the indoor space according to the control signal. The control signal may be
15 generated based on the humidification mode determined based on the information input by user 1 using user terminal device 400. When control system 500 includes a humidity sensor (not illustrated), the control signal may be generated based on the humidification mode determined based on the ambient humidity of user 1 sensed by
20 the humidity sensor. Examples of the humidification mode include the humidification degree of the air humidified by the humidification unit, the volume of humidified air delivered, and the humidification time. Specific examples of the humidification pattern achieved based on the humidification mode include a humidification pattern
25 which maintains a preset humidity according to the temperature of the air in the indoor space, a humidification pattern which periodically changes the humidity, and a humidification pattern which adjusts the humidity based on the difference between the surface temperature of the user and the ambient temperature of the user. The humidification pattern is not limited to the above
30 examples.
[0046]

The aroma diffuser generates a scent in the indoor space, and provides user 1 with the sentimental effect desired by user 1. The

aroma diffuser receives a control signal output from the controller based on the fragrance mode determined by the determiner, and generates a scent according to the control signal. Examples of the fragrance mode include the type of the scent, the intensity of the scent, the fragrance time, and the fragrance frequency. A specific fragrance pattern achieved by the fragrance mode may be stored in storage 130 in association with the sentimental effect desired by user 1.

[0047]

10 [User Terminal Device]

User terminal device 400 is, for example, a portable information terminal such as a smartphone or a tablet terminal, but may be a stationary information terminal such as a personal computer.

15 [0048]

Communicator 410 is a communication circuit for user terminal device 400 to communicate with control device 100. Communicator 410 is, for example, a wireless communication circuit which performs wireless communication. The communication standard for communication performed by communicator 410 is not particularly limited.

[0049]

Receiver 440 receives an input operation performed to transmit the information related to the thermal sensation felt or desired by user 1 and the information related to the mood felt or desired by user 1 to control device 100. Receiver 440 may be realized by, for example, a touch panel, a display panel, a hardware button, or a microphone. The touch panel may be, for example, a capacitive touch panel or a resistive touch panel. The display panel has an image display function and a function of receiving a manual input made by the user, and receives an input operation to a numeric keypad image or the like displayed on a display panel such as a liquid crystal panel or an organic electroluminescent (EL) panel. The microphone receives a voice input made by the user.

[0050]

Controller 420 controls the display of an image on receiver 440, performs voice recognition processing of the voice input by user 1, and the like. Controller 420 may be realized by, for example, a
5 microcomputer or a processor.

[0051]

Storage 430 is a storage device which stores a dedicated application program or the like to be executed by controller 420. Storage 430 is realized by, for example, a semiconductor memory.

10 [0052]

Although an example has been described where receiver 440 is a structural element of user terminal device 400, receiver 440 may be integrated with at least one of the other structural elements of control system 500. For example, receiver 440 may be incorporated
15 in blowing device 200, or may be incorporated in a remote controller (not illustrated).

[0053]

[3. Operation]

Next, an operation of control system 500 will be specifically
20 described with reference to the drawings.

[0054]

[Operation Example 1]

First, operation example 1 of control system 500 will be described. In operation example 1, control system 500 controls the
25 operation of each of a plurality of blowers (for example, first blower 240a, second blower 240b, third blower 240c) based on the width of the user. FIG. 4 is a flowchart of operation example 1 of the control system according to the embodiment. FIG. 5 illustrates an example of blowing control performed based on the width of the user.

30 [0055]

As illustrated in FIG. 4, first, information processor 120 obtains a result of detection from detector 30 via communicator 110 (S11). Detector 30 detects the user who is present in the direction in which the air is blown from blowing device 200. Detector 30 is,

for example, a ranging camera, and outputs a distance image to control device 100. For example, detector 30 may be a thermal image camera, an ultrasonic sensor, or an infrared sensor. The number of detectors 30 is not limited to one, but may include two or more sensors.

[0056]

Next, deriving unit 122 derives the horizontal width of the user with respect to first blower 240a, second blower 240b, and third blower 240c based on the result of detection (data such as a distance image) from detector 30 (S12). At this time, deriving unit 122 also derives the distance from blowing device 200 to the user.

[0057]

Here, the width of the user will be specifically described with reference to FIG. 5. FIG. 5 illustrates the widths of the users when the users face blowing device 200. In FIG. 5, (a) illustrates slender user 1a, and (b) illustrates heavy user 1b. Widths W_1 and W_2 of users 1a and 1b are the horizontal widths of users 1a and 1b with respect to blowing device 200, respectively. In other words, widths W_1 and W_2 of users 1a and 1b are the widths of users 1a and 1b in the horizontal direction as seen from blowing device 200, respectively, and are the widths of users 1a and 1b in the arrangement direction of first blower 240a, second blower 240b, and third blower 240c of blowing device 200. For example, widths W_1 and W_2 of users 1a and 1b are shoulder widths. Although not illustrated, for example, when users 1a and 1b are facing sideways with respect to blowing device 200, the widths of users 1a and 1b are the thickness of the users (width from chest to back).

[0058]

Next, determiner 124 determines the blowing mode at each of both ends and the center of the width of the user derived by deriving unit 122 based on the width of the user (S13). For example, determiner 124 may determine the above-mentioned blowing mode with reference to the blowing mode database (not illustrated) based on the width of the user. For example, in the blowing mode

database, the width of the user and the blowing modes at both ends and the center of the width of the user are associated with one another. As described above, examples of the blowing mode include a blowing speed, the volume of blown air, a blowing range, and periodic variations (so-called fluctuations) of these parameters.

[0059]

Next, controller 126 controls the operation of each of the blowers based on the blowing mode determined by determiner 124 (S14). For example, controller 126 determines the control pattern of each blower based on the blowing mode determined by determiner 124, taking the distance from each blower to the corresponding portion in the width of the user into consideration, and controls the operation of each blower according to the determined control pattern. At this time, controller 126 may determine the control pattern by referring to the control pattern database (not illustrated). For example, in the control pattern database, the blowing mode, the distance from each blower to the user, and the control pattern of the blower are associated with one another. The blowing mode database and the control pattern database may be stored in storage 130 or may be stored in a storage on the server.

[0060]

Here, the control of the blowers by controller 126 will be described with reference to FIG. 3 and FIG. 5. When controlling the operations of the blowers (for example, first blower 240a, second blower 240b, third blower 240c), controller 126 controls the volume of blown air by adjusting the volume of high-pressure air blown from each outlet. First blower 240a will be described with reference to FIG. 3. Controller 126 adjusts the volume of high-pressure air blown from two outlets 242a and 242b of first blower 240a to control the volume of air drawn to the space between two nozzles 241a and 241b of first blower 240a. By doing so, controller 126 controls the volume of air to be blown from first blower 240a. For example, as illustrated in (a) of FIG. 5 and (b) of FIG. 5, controller 126 controls the volume of air blown from each blower by adjusting the volume of

high pressure air blown from the outlets of each blower according to width W_1 and W_2 of users 1a and 1b. By controlling the volume of air blown from each blower, controller 126 is capable of controlling the blowing range, blowing strength, air speed, and the like of the air blown from each blower. The blowing control performed based on the width of the user is not limited to the examples illustrated in FIG. 5.

[0061]

[Variation 1 of Operation Example 1]

In operation example 1, deriving unit 122 may derive the horizontal height of the user (here, the length of the user in the height direction) from the result of detection from detector 30, and determiner 124 may determine the blowing mode based on the height of the user in addition to the horizontal width of the user. For example, determiner 124 may determine different blowing modes between when the user is sitting on a chair or the like and when the user is standing, by adjusting the blowing range and the blowing strength in the height direction at each of both ends and the center of the width of the user. In this case, controller 126 controls the direction of the air blown from each of the blowers by adjusting the direction of the high-pressure air blown from each of the outlets of the blowers based on the blowing mode. For example, controller 126 may control the direction of blown air by adjusting the volume of high-pressure air blown from each outlet such that the volume of and the speed of the air drawn to the space between adjacent nozzles can have gradients. Although not illustrated, an air direction adjusting plate for adjusting the direction of high-pressure air may be provided in each outlet, and controller 126 may adjust the direction of the high pressure air by adjusting the direction of the air direction adjusting plate of each outlet.

[0062]

[Variation 2 of Operation Example 1]

In operation example 1 and its variation 1, it may be that deriving unit 122 derives the surface temperature of the user (for

example, the skin temperature of the exposed portion of the skin) from the result of detection by detector 30, and determiner 124 determines the blowing mode based on the surface temperature of the user in addition to the width of the user. For example, when the surface temperature of the user is high, determiner 124 may determine the blowing mode in which the volume of air to be blown is increased and the blowing speed is increased. On the other hand, when the surface temperature of the user is low, determiner 124 may determine the blowing mode in which the volume of air to be blown is decreased and the blowing speed is decreased.

[0063]

[Operation Example 2]

Next, operation example 2 of control system 500 will be described. In operation example 2, the operation of each of the blowers is controlled based on the ambient temperature of the user in addition to the width of the user. FIG. 6 is a flowchart of operation example 2 of the control system according to the embodiment. Here, the features different from operation example 1 will be mainly described.

[0064]

As illustrated in FIG. 6, first, information processor 120 obtains the result of detection from detector 30 and sensing data from temperature sensor 50 via communicator 110 (S21).

[0065]

Next, deriving unit 122 derives the horizontal width of the user with respect to first blower 240a, second blower 240b, and third blower 240c based on the result of detection (data such as a distance image) from detector 30, and also derives the ambient temperature of the user based on the sensing data obtained by temperature sensor 50 (S22). Here, deriving unit 122 also derives the distance from blowing device 200 to the user.

[0066]

Next, determiner 124 determines the blowing mode at each of both ends and the center of the width of the user based on the width

of the user and the ambient temperature of the user derived by deriving unit 122 (S23).

[0067]

5 Next, controller 126 controls the operation of each of the blowers based on the blowing mode determined by determiner 124 (S24).

[0068]

[Variation 1 of Operation Example 2]

10 In operation example 2, when each of the blowers further includes a temperature adjuster, determiner 124 may determine the blowing mode for blowing the temperature-controlled air according to the ambient temperature of the user. In this case, controller 126 performs control for adjusting the temperature of the air blown from each blower based on the blowing mode.

15 [0069]

[Variation 2 of Operation Example 2]

20 In operation example 2, it may be that deriving unit 122 derives the surface temperature of the user (for example, the skin temperature of the exposed portion of the skin) from the result of detection by detector 30, and when the absolute value of the difference between the surface temperature of the user and the ambient temperature of the user is greater than a predetermined value, determiner 124 changes the blowing mode such that the absolute value of the difference is less than or equal to the
25 predetermined value. At this time, blowing device 200 blows air with a temperature adjusted by the temperature adjuster.

[0070]

[Variation 3 of Operation Example 2]

30 In operation example 2, it may be that control system 500 further includes a humidity sensor which senses the ambient humidity of the user. When each of the blowers further includes a humidification unit (not illustrated), determiner 124 may further determine the blowing mode for blowing the humidity-adjusted air based on the ambient humidity of the user sensed by the humidity

sensor. More specifically, determiner 124 determines the humidification mode of the humidification unit, and further determines the blowing mode of the blower for blowing the humidified air. Controller 126 performs control for adjusting the humidity of the air to be blown from each blower based on the determined humidification mode. For example, controller 126 may control at least one of the volume, the discharge time, or the discharge frequency of the humidified air discharged from the humidification unit.

10 [0071]

Note that, in operation example 2, control may be performed by appropriately combining variations 1 to 3 of operation example 2.

[0072]

[Operation Example 3]

15 Subsequently, operation example 3 of control system 500 will be described. In operation example 3, in addition to the width of the user, the operation of each of the blowers is controlled based on whether or not the input of the information related to the thermal sensation desired by the user and the information related to the mood desired by the user have been received. FIG. 7 is a flowchart of operation example 3 of the control system according to the embodiment. Here, the features different from operation example 1 and operation example 2 will be mainly described.

20 [0073]

25 FIG. 7 illustrates a flow after the result of detection is obtained from detector 30 (S11 in FIG. 4). Deriving unit 122 derives the horizontal width of the user with respect to first blower 240a, second blower 240b, and third blower 240c based on the result of detection from detector 30 (S31).

30 [0074]

Next, information processor 120 determines whether or not receiver 440 has received the input of the information related to the mood desired by the user (hereinafter, referred to as the information related to the mood) (S32). In other words, information processor

120 determines whether or not the information related to the mood has been obtained from user terminal device 400 via communicator 110.

[0075]

5 When information processor 120 determines that the information related to the mood has not been obtained (No in S32), information processor 120 determines whether or not receiver 440 has received the input of the information related to the thermal sensation desired by the user (hereinafter referred to as the
10 information related to the thermal sensation) (S33). In other words, information processor 120 determines whether or not the information related to the thermal sensation has been obtained from user terminal device 400 via communicator 110. When information processor 120 determines that the information related to the thermal
15 sensation has not been obtained (No in S33), information processor 124 determines the blowing mode at each of both ends and the center of the width of the user based on the width of the user (S34). On the other hand, when information processor 120 determines that the information related to the thermal sensation has been obtained
20 (Yes in S33), determiner 124 determines the blowing mode at each of both ends and the center of the width of the user based on the width of the user and the information related to the thermal sensation (S35). For example, determiner 124 may determine the blowing mode corresponding to the width of the user and the information
25 related to the thermal sensation from the blowing mode database and the thermal sensation and blowing mode database stored in storage 130.

[0076]

30 On the other hand, when information processor 120 determines that the information related to the mood has been obtained (Yes in S32), information processor 120 determines whether or not the input of the information related to the thermal sensation has been received by receiver 440 (S36). When information processor 120 determines that the information related to

the thermal sensation has not been obtained (No in S36), determiner 124 determines the blowing mode at each of both ends and the center of the width of the user based on the width of the user and the information related to the mood (S37). For example, determiner 5 124 may determine the blowing mode corresponding to the width of the user and the information related to the mood from the blowing mode database and the mood and blowing mode database stored in storage 130. On the other hand, when information processor 120 determines that the information related to the thermal sensation has 10 been obtained (Yes in S36), determiner 124 determines the blowing mode at each of both ends and the center of the width of the user based on the width of the user and the information related to the mood and the thermal sensation (S38). For example, determiner 124 may determine the blowing mode corresponding to the 15 information related to the width, the mood and the thermal sensation of the user from the blowing mode database, the mood and blowing mode database, and the thermal sensation and blowing mode database stored in storage 130.

[0077]

20 Next, controller 126 controls the operation of each of the blowers based on the blowing mode determined by the above processing (S39). For example, controller 126 may control the operation of each of the blowers by reading the control pattern of each of the blowers associated with the blowing mode and the 25 distance from the blower to the user from the control pattern database stored in storage 130.

[0078]

In operation example 3, for example, sensing data may be obtained from temperature sensor 50 in addition to the result of 30 detection from detector 30 (S21 in FIG. 6). In this case, determiner 124 further determines the blowing mode at each of both ends and the center of the width of the user based on the ambient temperature of the user.

[0079]

[Variation 1 of Operation Example 3]

In operation example 3, when control system 500 further includes lighting unit 311, determiner 124 may determine the lighting mode of lighting unit 311 based on the information related to the thermal sensation desired by the user, and the information related to the mood desired by the user, and controller 126 may control lighting unit 311 based on the determined lighting mode. Specifically, controller 126 controls at least one of the chromaticity and intensity of the light emitted from lighting unit 311.

10 [0080]

[Variation 2 of Operation Example 3]

In operation example 3, when control system 500 further includes audio unit 321, determiner 124 may determine the audio mode of audio unit 321 based on the information related to the thermal sensation desired by the user and the mood desired by the user, and controller 126 may control audio unit 321 based on the determined audio mode. Specifically, controller 126 controls at least one of the type, volume, and reproduction speed of the sound reproduced by audio unit 321.

20 [0081]

[Variation 3 of Operation Example 3]

In operation example 3, when control system 500 further includes a humidification unit (not illustrated), determiner 124 may determine the humidification mode of the humidification unit based on the information related to the thermal sensation desired by the user and the mood desired by the user, and controller 126 may control the humidification unit based on the determined humidification mode. The controlled humidification unit may be a humidification unit included in blowing device 200, or may be a humidification unit included in a humidifier provided in the room. Specifically, controller 126 may control at least one of the volume, the discharge time, and the discharge frequency of the humidified air discharged from the humidification unit.

[0082]

Note that, in operation example 3, control may be performed by appropriately combining variations 1 to 3 of operation example 3.
[0083]

[Operation Example 4]

5 Subsequently, operation example 4 of control system 500 will be described. In operation example 4, when the information related to the thermal sensation or the mood desired by the user is newly input after operation example 3, the blowing mode is changed. FIG. 8 is a flowchart of operation example 4 of the control system
10 according to the embodiment.
[0084]

After the blowing mode is determined in operation example 3 illustrated in FIG. 7, information processor 120 determines whether or not the input of new information has been received by receiver 440
15 (S41). In other words, information processor 120 determines whether or not the new information has been obtained from user terminal device 400 via communicator 110.
[0085]

When information processor 120 determines that the input of
20 new information has not been received (No in S41), information processor 120 executes the process of S39 in FIG. 7.
[0086]

On the other hand, when information processor 120 determines that the input of new information has been received (Yes
25 in S41), information processor 120 determines whether the information is related to the thermal sensation (Yes) or the information is related to the mood (No) (S42).
[0087]

When information processor 120 determines that the new
30 information is related to the thermal sensation (Yes in S42), determiner 124 changes the blowing mode at each of both ends and the center of the width of the user based on the information related to the thermal sensation (S43).
[0088]

On the other hand, when information processor 120 determines that the new information is related to the mood (No in S42), determiner 124 changes the blowing mode at each of both ends and the center of the width of the user based on the information related to the mood (S44). When information processor 120 determines that the new information is related to both the thermal sensation and the mood, determiner 124 changes the blowing mode based on the information related to the thermal sensation and the mood (not illustrated).

10 [0089]

Next, controller 126 controls the operation of each of the blowers based on the blowing mode after changing (S45).

[0090]

[Variation 1 of Operation Example 4]

15 In operation example 4, when the information related to the thermal sensation desired by the user and the information related to the mood desired by the user are newly input after variation 1 of operation example 3, determiner 124 may determine the lighting mode of lighting unit 311 based on the information newly input, and
20 controller 126 may control lighting unit 311 based on the determined lighting mode.

[0091]

[Variation 2 of Operation Example 4]

Moreover, in operation example 4, when the information related to the thermal sensation desired by the user and the information related to the mood desired by the user are newly input after variation 2 of operation example 3, determiner 124 may determine the audio mode of audio unit 321, and controller 126 may control audio unit 321 based on the determined audio mode.

30 [0092]

[Variation 3 of Operation Example 4]

In operation example 4, after variation 3 of operation example 3, determiner 124 may determine the humidification mode of the humidification unit based on the information related to the thermal

sensation desired by the user and the information related to the mood desired by the user, and controller 126 may control the humidification unit based on the determined humidification mode.

[0093]

5 Note that, in operation example 4, control may be performed by appropriately combining Variations 1 to 3 of operation example 4.

[0094]

[4. Advantageous Effects, etc.]

As described above, control system 500 includes: a plurality of
10 blowers (for example, first blower 240a, second blower 240b, third blower 240c) which blow air toward a plurality of positions aligned in the horizontal direction and corresponding to the blowers; detector 30 which detects user 1 who is present in the direction in which air is blown; deriving unit 122 which derives the horizontal width of user 1
15 with respect to the blowers (first blower 240a, second blower 240b, third blower 240c) based on the result of detection from detector 30; determiner 124 which determines the blowing mode at each of both ends and the center of the horizontal width of user 1 derived, based on the width of user 1; and controller 126 which controls the
20 operation of each of the blowers (first blower 240a, second blower 240b, third blower 240c) based on the determined blowing mode.

[0095]

Since such a control system 500 is capable of individually controlling the operation of the blowers according to the horizontal
25 width of the user with respect to the blowers, it is possible to perform comfortable air conditioning control according to the user.

[0096]

Moreover, for example, in control system 500, each of blowers (first blower 240a, second blower 240b, third blower 240c) includes
30 two nozzles 241a to 241f which are disposed with a space in between. Each of two nozzles 241a to 241f includes one lateral face with one of outlets 242a to 242f for blowing high-pressure air. The one lateral faces of two nozzles 241a to 241f are flush with each other. Each of blowers (first blower 240a, second blower 240b, third blower 240c)

blows, toward a corresponding one of the plurality of positions, air drawn to the space by the high-pressure air blown from outlets 242a to 242f. When controlling the operation of each of the blowers (first blower 240a, second blower 240b, third blower 240c), controller 126 controls the volume of blown air by adjusting the volume of high-pressure air blown from each outlet 242a to 242f.

[0097]

Such a control system 500 is capable of controlling the blowing range and the speed of the air blown from the blowers by adjusting the flow rate of the high-pressure air from the outlet of each nozzle.

[0098]

Moreover, for example, in control system 500, controller 126 further controls the direction of the air by adjusting the direction of the high-pressure air blown from outlets 242a to 242f.

[0099]

Such a control system 500 is capable of blowing air in a desired direction. Control system 500 is also capable of appropriately changing the air blowing range.

[0100]

Moreover, for example, in control system 500, deriving unit 122 further derives the vertical height of user 1 from the result of detection, and determiner 124 further determines the blowing mode based on the derived vertical height of user 1.

[0101]

Since such a control system 500 is further capable of performing blowing control according to the vertical height of user 1, it is possible to perform more comfortable air conditioning control according to the user.

[0102]

Moreover, for example, in control system 500, deriving unit 122 further derives the surface temperature of user 1 from the result of detection, and determiner 124 further determines the blowing mode based on the derived surface temperature of user 1.

[0103]

Since such a control system 500 is further capable of performing blowing control according to the surface temperature of the user, it is possible to perform more comfortable air conditioning control according to the user.

5 [0104]

Moreover, for example, control system 500 further includes temperature sensor 50 which senses the ambient temperature of user 1, and determiner 124 further determines the blowing mode based on the sensed ambient temperature of user 1.

10 [0105]

Since such a control system 500 is further capable of performing blowing control according to the ambient temperature of the user, it is possible to perform more comfortable air conditioning control.

15 [0106]

Moreover, for example, in control system 500, each of blowers (first blower 240a, second blower 240b, third blower 240c) further includes a temperature adjuster which adjusts the temperature of the air (for example, first temperature adjuster 250a, second temperature adjuster 250b, third temperature adjuster 250c), and controller 126 causes each temperature adjuster (first temperature adjuster 250a, second temperature adjuster 250b, third temperature adjuster 250c) to adjust the temperature of the air in the control of the operations of the blowers (first blower 240a, second blower 240b, third blower 240c).

[0107]

Since such a control system 500 is capable of adjusting the temperature of the air blown by each of the blowers, it is possible to perform more comfortable air conditioning control.

30 [0108]

Moreover, for example, control system 500 further includes receiver 440 which receives input of information related to the thermal sensation desired by user 1 and information related to the mood desired by user 1, and determiner 124 further determines the

blowing mode based on the information from receiver 440.

[0109]

5 Since such a control system 500 is capable of performing blowing control according to the information related to the thermal sensation and the mood desired by the user, it is possible to perform comfortable air conditioning control according to the user's preference. At least one of first information or second information can be output based on the stored information.

[0110]

10 Moreover, for example, in control system 500, when the information related to the mood desired by user 1 is information indicating a desire for relaxation, determiner 124 determines the blowing mode which increases a ratio of the volume of air at each of both ends of the width of user 1 to the volume of air at the center of
15 the width of user 1. When the information related to the mood desired by user 1 is information indicating a desire for awakening, determiner 124 determines the blowing mode which decreases the ratio.

[0111]

20 Such a control system 500 is capable of performing blowing control according to the mood desired by the user.

[0112]

Moreover, for example, in control system 500, when receiver 440 receives the information that is newly input, determiner 124
25 changes the blowing mode based on the information that is newly input, and controller 126 controls the operation of each of the blowers (first blower 240a, second blower 240b, third blower 240c) based on the blowing mode after changing.

[0113]

30 Since such a control system 500 is capable of performing blowing control according to the change in the thermal sensation and the mood desired by the user, it is possible to perform comfortable air conditioning control according to the user's preference.

[0114]

Moreover, for example, control system 500 further includes lighting unit 311, determiner 124 further determines the lighting mode of lighting unit 311 based on the information from receiver 440, and controller 126 controls at least one of the chromaticity or the intensity of the light emitted from lighting unit 311 based on the determined lighting mode.

[0115]

Since such a control system 500 is also capable of performing lighting control in addition to blowing control according to the thermal sensation and the mood desired by the user, it is possible to provide the user with a visually comfortable environment.

[0116]

Moreover, for example, control system 500 further includes audio unit 321, determiner 124 further determines the audio mode of audio unit 321 based on the information from receiver 440, and controller 126 further controls at least one of the type, volume, and reproduction speed of the sound reproduced from audio unit 321, based on the determined audio mode.

[0117]

Since such a control system 500 is also capable of performing audio control in addition to blowing control according to the thermal sensation and the mood desired by the user, it is possible to provide the user with an aurally comfortable environment.

[0118]

Moreover, for example, control system 500 further includes a humidification unit (not illustrated).

[0119]

Since such a control system 500 is capable of performing humidity control in addition to blowing control, it is possible to provide the user with a more comfortable environment.

[0120]

Moreover, the control method performed by a computer such as control system 500 is a method of controlling air blowing device 200 which includes a plurality of blowers (first blower 240a, second

blower 240a, third blower 240c) which blow air toward a plurality of positions which are aligned in the horizontal direction and correspond to the blowers. The method includes: detecting user 1 who is present in a direction in which air is blown from air blowing device 200, deriving the horizontal width of user 1 with respect to the blowers (first blower 240a, second blower 240b, third blower 240c) based on a result of detection, determining the blowing mode at each of both ends and the center of the horizontal width of user 1 derived based on the horizontal width of user 1, and controlling the operation of each of the blowers (first blower 240a, second blower 240b, third blower 240c) based on the determined blowing mode.

[0121]

Since such a control method is capable of individually controlling the operations of the blowers according to the horizontal width of the user with respect to the blowers, it is possible to perform comfortable air conditioning control according to the user.

[0122]

(Other Embodiments)

Although the embodiment has been described above, the present invention is not limited to the above embodiment.

[0123]

Moreover, in the above embodiment, another processor may execute the process executed by a specific processor. The order of a plurality of processes may be changed, or a plurality of processes may be executed in parallel.

[0124]

Moreover, in the above embodiment, each structural element may be realized by executing a software program suitable for the structural element. Each structural element may be realized by a program execution 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.

[0125]

Each structural element may be realized by hardware. Each

structural element may be a circuit (or an integrated circuit). These circuits may form one circuit as a whole, or may be separate circuits. Moreover, each of these circuits may be a general-purpose circuit or a dedicated circuit.

5 [0126]

Moreover, general or specific aspects of the present invention may be realized by a system, an apparatus, a method, an integrated circuit, a computer program, or a recording medium such as a computer-readable CD-ROM. General or specific aspects of the present invention may also be realized by any combination of a system, an apparatus, a method, an integrated circuit, a computer program and a recording medium.

[0127]

For example, the present invention may be realized as a control method, or as a program for causing a computer to execute the control method, or a non-transitory computer-readable recording medium in which such a program is recorded.

[0128]

Moreover, in the above embodiment, the control system may be realized as a single device such as an information terminal, or may be realized by a plurality of devices. For example, the control system may be realized as a client-server system. When the control system is realized by a plurality of devices, the structural elements included in the control system described in the above embodiment may be distributed to the plurality of devices in any way.

[0129]

Note that embodiments resulting from variations of the above embodiment conceived by those skilled in the art, as well as embodiments resulting from arbitrary combinations of structural elements and functions in the above embodiment which are within the essence of the present disclosure are also included in the present invention.

[0130]

[5. Monitor Test]

Hereinafter, monitor tests conducted will be described. In the monitor tests, a blowing device including three blowers illustrated in FIG. 3 was used and the speed of air blown from each of the blowers was changed. The subjects were twenty adult women.

5 As illustrated in FIG. 5, each subject was facing the blower. The blower performed blowing control according to the width of each subject. Hereinafter, descriptions will be given with reference to (a) and (b) of FIG. 5. In the following experimental examples, the speeds of the air blown from first blower 240a and third blower 240c

10 were the same, first blower 240a blew air to the right end of the width of the subject, and third blower 240c blew air to the left end of the width of the subject. Second blower 240b blew air to the center of the width of the subject. In the description below, the air speed at the center of the width of the subject and the air speeds at both

15 ends of the width of the subject were measured. The subject was positioned one meter away from the blowing device.

[0131]

[Experimental Example 1]

In Experimental Example 1, air was applied to the center of the

20 width of the subject, and the air speed at which the subject felt gentle air was verified. The results are indicated in FIG. 9.

[0132]

FIG. 9 is a graph illustrating the results of Experimental Example 1. As indicated in FIG. 9, it was found that it was good to

25 set the air speed at the center of the width of the subject to be slightly lower than the normal air speed.

[0133]

[Experimental Example 2]

In Experimental Example 2, the ratio of the air speeds at both

30 ends of the width of the subject to the air speed at the center of the width of the subject was varied to verify the blowing ratio at which the subject felt comfortable. The left end of the horizontal axis indicates that the air speed ratio is 1, that is, the air speeds at both ends : the air speed at the center = 1: 1. The air speeds at both

ends are higher than the air speed at the center as the axis moves further to the right of the horizontal axis. The results are indicated in FIG. 10.

[0134]

5 FIG. 10 is a graph illustrating the results of Experimental Example 2. As indicated in FIG. 10, it was found that the subject felt comfortable when the air speeds at both ends of the width of the subject were slightly higher than the air speed at the center of the width of the subject, and the subject felt less comfortable when the
10 air speeds at both ends were excessively higher than when the air speed ratio was 1.

[0135]

[Experimental Example 3]

 In Experimental Example 3, the ratio of the air speeds at both
15 ends of the width of the subject to the air speed at the center of the width of the subject was varied to verify the blowing ratio at which the subject felt relaxed. In a similar manner to Experimental Example 2, the blowing ratio is 1 at the left end of the horizontal axis, and the air speed ratio increases as the axis moves further to the
20 right of the horizontal axis. In other words, the air speeds at both ends are higher than the air speed at the center. The results are indicated in FIG. 11.

[0136]

 FIG. 11 is a graph illustrating the results of Experimental
25 Example 3. As illustrated in FIG. 11, it was found that the subject felt relaxed when the air speeds at both ends of the width of the subject were higher than the air speed at the center of the width of the subject, and when the air speeds at both ends were further increased, the subject felt approximately the same as when the air
30 speed ratio was 1.

[0137]

[Summary]

 From the above experimental examples, it was found that the blowing mode which made the subject feel comfortable, relaxed, a

sense of peace, etc. was a mode in which the air speeds at both ends of the width of the subject were slightly higher than the air speed at the center of the width of the subject. It seems like such a mode makes the subject feel wrapped up and provides the subject with a sense of relief.

[0138]

Although no data is shown here, when the user wants to feel awoken and wants to feel refreshed, it was found that the blowing mode which is the opposite to the blowing ratios in Experimental Example 2 and Experimental Example 3, that is, the mode in which the air speed at the center of the width of the subject is higher than the air speeds at both ends of the width of the subject was effective.

[Reference Signs List]

[0139]

15	1, 1a, 1b	user
	30	detector
	50	temperature sensor
	122	deriving unit
	124	determiner
20	126	controller
	200	blowing device
	240a	first blower
	240b	second blower
	240c	third blower
25	311	lighting unit
	321	audio unit
	400	user terminal device
	440	receiver
	500	control system

30

[CLAIMS]

[Claim 1]

A control system comprising:

5 a plurality of blowers which blow air toward a plurality of positions aligned in a horizontal direction, the plurality of positions corresponding to the plurality of blowers;

a detector which detects a user who is present in a direction to which the air is blown;

10 a deriving unit which derives a horizontal width of the user with respect to the plurality of blowers based on a result of detection from the detector;

a determiner which determines a blowing mode at each of both ends and a center of the horizontal width of the user derived, based on the horizontal width of the user; and

15 a controller which controls an operation of each of the plurality of blowers based on the blowing mode determined.

[Claim 2]

20 The control system according to claim 1,
wherein each of the plurality of blowers includes two nozzles which are disposed with a space in between, each of the two nozzles including one lateral face with an outlet for blowing high-pressure air, the one lateral faces of the two nozzles being flush with each other,
each of the plurality of blowers blows, toward a corresponding
25 one of the plurality of positions, the air drawn to the space by the high-pressure air blown from the outlet, and

when controlling the operation of each of the plurality of blowers, the controller controls a volume of the air blown, by adjusting a volume of the high-pressure air blown from the outlet.

30

[Claim 3]

The control system according to claim 2,
wherein the controller further controls a direction of the air by adjusting a direction of the high-pressure air blown from the outlet.

[Claim 4]

The control system according to any one of claims 1 to 3,
wherein the deriving unit further derives a vertical height of
5 the user from the result of detection, and
the determiner further determines the blowing mode based on
the vertical height of the user derived.

[Claim 5]

10 The control system according to any one of claims 1 to 4,
wherein the deriving unit further derives a surface
temperature of the user from the result of detection, and
the determiner further determines the blowing mode based on
the surface temperature of the user derived.

15

[Claim 6]

The control system according to any one of claims 1 to 5,
further comprising
a temperature sensor which senses an ambient temperature of
20 the user,
wherein the determiner further determines the blowing mode
based on the ambient temperature of the user sensed.

[Claim 7]

25 The control system according to any one of claims 1 to 6,
wherein each of the plurality of blowers further includes a
temperature adjuster which adjusts a temperature of the air, and
when controlling the operation of each of the plurality of
blowers, the controller causes the temperature adjuster to adjust the
30 temperature of the air.

[Claim 8]

The control system according to any one of claims 1 to 7,
further comprising

a receiver which receives an input of information related to a thermal sensation desired by the user and information related to a mood desired by the user,

5 wherein the determiner further determines the blowing mode based on the information from the receiver.

[Claim 9]

The control system according to claim 8,

10 wherein, when the information related to the mood desired by the user is information indicating a desire for relaxation, the determiner determines the blowing mode which increases a ratio of a volume of the air at each of both ends of the horizontal width of the user to a volume of the air at a center of the horizontal width of the user, and

15 when the information related to the mood desired by the user is information indicating a desire for awakening, the determiner determines the blowing mode which decreases the ratio.

[Claim 10]

20 The control system according to claim 8,

wherein, when the receiver receives the information that is newly input, the determiner changes the blowing mode based on the information that is newly input, and

25 the controller controls the operation of each of the plurality of blowers based on the blowing mode after changing.

[Claim 11]

The control system according to claim 8, further comprising a lighting unit,

30 wherein the determiner further determines a lighting mode of the lighting unit based on the information from the receiver, and

the controller controls at least one of a chromaticity or an intensity of light emitted from the lighting unit, based on the lighting mode determined.

[Claim 12]

The control system according to claim 8, further comprising an audio unit,

5 wherein the determiner further determines an audio mode of the audio unit based on the information from the receiver, and the controller further controls at least one of a type, a volume, or a reproduction speed of a sound reproduced by the audio unit, based on the audio mode determined.

10

[Claim 13]

The control system according to any one of claims 1 to 12, further comprising a humidification unit.

15 [Claim 14]

A control method of controlling a blowing device which includes a plurality of blowers which blow air toward a plurality of positions aligned in a horizontal direction and corresponding to the plurality of blowers, the control method comprising:

20 detecting a user who is present in a direction to which the air is blown from the blowing device;

deriving a horizontal width of the user with respect to the plurality of blowers based on a result of detection obtained in the detecting;

25 determining a blowing mode at each of both ends and a center of the horizontal width of the user derived in the deriving, based on the horizontal width of the user; and

controlling an operation of each of the plurality of blowers based on the blowing mode determined.

30

[Claim 15]

A program for causing a computer to perform the control method according to claim 14.