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(54) **AIR CONDITIONER, TARGET TEMPERATURE DETERMINATION METHOD, PROGRAM, AND STORAGE MEDIUM**

(57) An air conditioner includes an air-conditioning storage and an air-conditioning controller. The air-conditioning storage stores a temperature range and a temperature determination criterion. The controller acquires an external air temperature of a control space, acquires the temperature range and the temperature determination criterion, determines as to which of a heating range,

an intermediate range, and a cooling range of the temperature range the external air temperature falls within, determines a first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined temperature range, and determines a target temperature based on the first temporary target temperature.

FIG. 1A

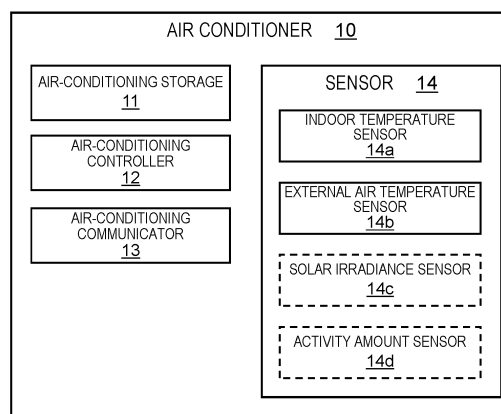
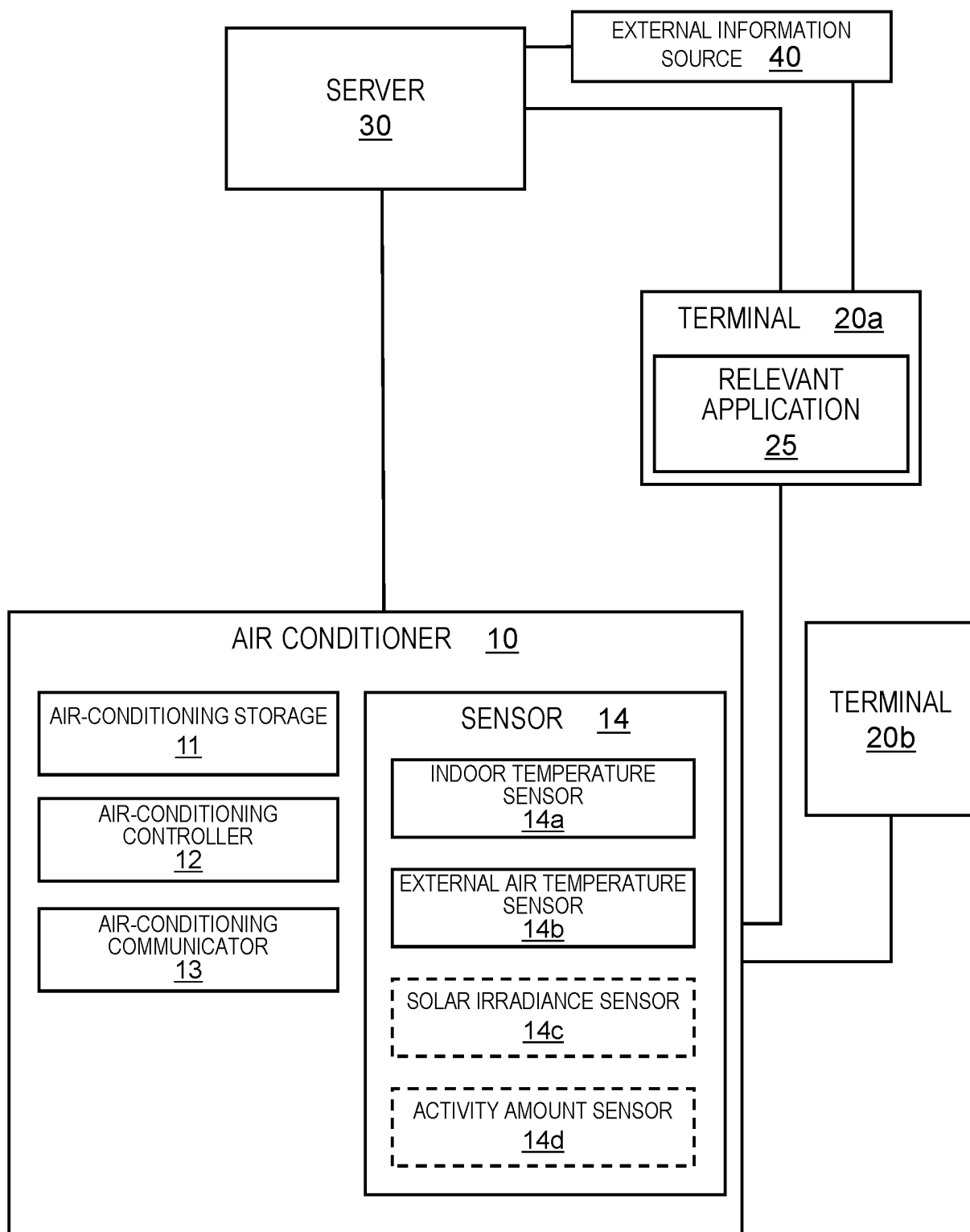


FIG. 1B



Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to an air conditioner, a target temperature determination method, a program, and a storage medium.

2. Description of the Related Art

[0002] The air conditioner can be operated in a plurality of operation modes such as a heating mode and a cooling mode. As described in PTL 1, there has been researched and developed a technology for operating an air conditioner by automatically selecting an operation mode from a heating mode and a cooling mode.

Citation List

Patent Literature

[0003] PTL 1: Unexamined Japanese Patent Publication No. H06-331199

SUMMARY

[0004] The known air conditioner can automatically determine the operation mode, but cannot automatically determine the target temperature of air-conditioning control in the operation mode. Even in an automatic operation mode, after receiving a set temperature from the user of the air conditioner in advance, the air conditioner determines the target temperature based on the set temperature. That is, the known air conditioner needs a user's instruction in order to determine the target temperature.

[0005] Note that the set temperature in the present disclosure is a user set temperature input by the user via a remote controller of the air conditioner, a smartphone associated with the air conditioner, or the like. On the other hand, the target temperature in the present disclosure is a temperature to be an induction target of a detected indoor temperature, and is a temperature estimated to be comfortable for the user.

[0006] An object of the present disclosure is to provide an air conditioner, a target temperature determination method, a program, and a storage medium that can automatically determine an appropriate target temperature for a control space to be subjected to air-conditioning control.

[0007] The present disclosure provides an air conditioner, a target temperature determination method, a program, and a storage medium.

[0008] An air conditioner of one aspect according to the present disclosure includes an air-conditioning storage and an air-conditioning controller, and can determine

target temperature appropriate for a control space to be subjected to air-conditioning control. The storage stores a temperature range including a heating range, an intermediate range, and a cooling range. The storage further stores a temperature determination criterion including a heating determination criterion and a cooling determination criterion. The heating determination criterion defines a first relationship between an external air temperature falling within the heating range and the intermediate range and a first temporary target temperature. The cooling determination criterion defines a second relationship between an external air temperature falling within the cooling range and the intermediate range and the first temporary target temperature. The air-conditioning controller acquires an external air temperature of the control space, acquires the temperature range and the temperature determination criterion, determines as to which of the heating range, the intermediate range, and the cooling range of the temperature range the external air temperature falls within, determines the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined temperature range, and determines the target temperature based on the first temporary target temperature.

[0009] A target temperature determination method of another aspect according to the present disclosure can determine an appropriate target temperature for a control space to be subjected to air-conditioning control. The target temperature determination method includes: acquiring an external air temperature of the control space; acquiring a temperature range including a heating range, an intermediate range, and a cooling range, and acquiring a temperature determination criterion including a heating determination criterion and a cooling determination criterion, in which the heating determination criterion defines a first relationship between an external air temperature falling within the heating range and the intermediate range, and a first temporary target temperature, and the cooling determination criterion defines a second relationship between an external air temperature falling within the cooling range and the intermediate range, and the first temporary target temperature; determining as to which of the heating range, the intermediate range, and the cooling range of the temperature range the external air temperature falls within; determining the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined temperature range; and determining the target temperature based on the first temporary target temperature.

[0010] A program of another aspect according to the present disclosure causes an air conditioner to execute the target temperature determination method of the above aspect.

[0011] A storage medium of another aspect according to the present disclosure is a non-transitory computer-readable storage medium storing a computer program

including the program of the above aspect. In the storage medium, when the computer program is executed by a processor, the target temperature determination method is implemented.

[0012] In the present disclosure, according to the air conditioner, the target temperature determination method, the program, and the storage medium, an appropriate target temperature can be automatically determined for a control space to be subjected to air-conditioning control.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1A is a block diagram of an example of an air conditioner in a first exemplary embodiment;

Fig. 1B is a block diagram of an example of a use environment of the air conditioner in the first exemplary embodiment;

Fig. 2 is a flowchart of an example of a target temperature determination method in the first exemplary embodiment;

Fig. 3 is a view illustrating an example of a temperature determination criterion in the first exemplary embodiment;

Fig. 4 is a flowchart of an example of step S400 in a case of a heating range in the first exemplary embodiment;

Fig. 5 is a flowchart of an example of step S400 in a case of a cooling range in the first exemplary embodiment;

Fig. 6 is a flowchart of an example of step S400 in a case of an intermediate range in the first exemplary embodiment;

Fig. 7 is a flowchart of an example of step S431 in the first exemplary embodiment;

Fig. 8A is a view illustrating an example of a mode determination criterion in the first exemplary embodiment;

Fig. 8B is a view illustrating another example of the mode determination criterion in the first exemplary embodiment;

Fig. 9 is a flowchart of an example of step S500 in the first exemplary embodiment;

Fig. 10 is a flowchart of an example of step S500 in a second exemplary embodiment;

Fig. 11 is a flowchart of an example of step S430 in the second exemplary embodiment;

Fig. 12 is a flowchart of an example of a target temperature determination method in the second exemplary embodiment;

Fig. 13A is a block diagram of an example of terminal 20a in a third exemplary embodiment;

Fig. 13B is a block diagram of an example of terminal 20b in the third exemplary embodiment;

Fig. 14 is a flowchart of an example of a notification method in the third exemplary embodiment;

Fig. 15A is a view illustrating a presentation example

of a target temperature by terminal 20a in the third exemplary embodiment;

Fig. 15B is a view illustrating a presentation example of a target temperature by terminal 20a in the third exemplary embodiment;

Fig. 15C is a view illustrating a presentation example of a target temperature by terminal 20b in the third exemplary embodiment; and

Fig. 16 is a flowchart of an example of a presentation method in the third exemplary embodiment.

DETAILED DESCRIPTIONS

[0014] To begin with, various aspects of the air conditioner, the target temperature determination method, the program, and the storage medium will be described.

[0015] An air conditioner of a first aspect according to the present disclosure includes an air-conditioning storage and an air-conditioning controller, and can determine target temperature appropriate for a control space to be subjected to air-conditioning control. The storage stores a temperature range including a heating range, an intermediate range, and a cooling range. The storage further stores a temperature determination criterion including a heating determination criterion and a cooling determination criterion. The heating determination criterion defines a first relationship between an external air temperature falling within the heating range and the intermediate range and a first temporary target temperature. The cooling determination criterion defines a second relationship between an external air temperature falling within the cooling range and the intermediate range and the first temporary target temperature. The air-conditioning controller acquires an external air temperature of the control space, acquires the temperature range and the temperature determination criterion, determines as to which of the heating range, the intermediate range, and the cooling range of the temperature range the external air temperature falls within, determines the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined temperature range, and determines the target temperature based on the first temporary target temperature.

[0016] In the air conditioner of a second aspect according to the present disclosure, in the first aspect, the temperature determination criterion may be generated based on a feedback history of a situation where a user feels comfortable in the control space.

[0017] In the air conditioner of a third aspect according to the present disclosure, in the second aspect, the feedback history may include a user set temperature and an external air temperature when the user feels comfortable.

[0018] In the air conditioner of a fourth aspect according to the present disclosure, in any one of the first to third aspects, when the determined temperature range is the heating range, the air-conditioning controller may determine a heating mode as an operation mode, and may

determine the first temporary target temperature based on the external air temperature and the heating determination criterion.

[0019] In the air conditioner of a fifth aspect according to the present disclosure, in any one of the first to fourth aspects, when the determined temperature range is the cooling range, the air-conditioning controller may determine a cooling mode as an operation mode, and may determine the first temporary target temperature based on the external air temperature and the cooling determination criterion.

[0020] In the air conditioner of a sixth aspect according to the present disclosure, in any one of the first to fifth aspects, when the determined temperature range is the intermediate range, the air-conditioning controller may determine a second temporary target temperature based on the external air temperature, the heating determination criterion, and the cooling determination criterion, may determine a heating mode or a cooling mode as an operation mode based on the external air temperature and the second temporary target temperature, and may determine the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined operation mode.

[0021] In the air conditioner of a seventh aspect according to the present disclosure, in the sixth aspect, when the determined temperature range is the intermediate range, the air-conditioning controller may determine, as the second temporary target temperature, a mean value of the first temporary target temperature that the external air temperature corresponds to in the heating determination criterion and the first temporary target temperature that the external air temperature corresponds to in the cooling determination criterion.

[0022] In the air conditioner of an eighth aspect according to the present disclosure, in the sixth aspect or the seventh aspect, when the determined temperature range is the intermediate range, the air-conditioning controller may calculate a mean value of the first temporary target temperature that the external air temperature corresponds to in the heating determination criterion and the first temporary target temperature that the external air temperature corresponds to in the cooling determination criterion, may acquire a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space, and may determine a sum of the mean value and the shift value as the second temporary target temperature.

[0023] An air conditioner of a ninth aspect according to the present disclosure, in any one of the sixth to eighth aspects, may further include an indoor temperature sensor that detects an indoor temperature of the control space. When determining the heating mode or the cooling mode as the operation mode based on the external air temperature and the second temporary target tempera-

ture, the air-conditioning controller may acquire the indoor temperature by the indoor temperature sensor, acquires a mode determination criterion, and may determine the heating mode or the cooling mode as the operation mode based on the external air temperature, the second temporary target temperature, the indoor temperature, and the mode determination criterion. The mode determination criterion may be a combination of at least one external air temperature threshold and at least one temperature difference threshold. The external air temperature threshold is relevant to an external air temperature. The temperature difference threshold is relevant to a temperature difference between the indoor temperature and the second temporary target temperature.

[0024] In the air conditioner of a 10th aspect according to the present disclosure, in any one of the first to ninth aspects, when determining the target temperature based on the first temporary target temperature, the air-conditioning controller may acquire a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space, and may determine a sum of the first temporary target temperature and the shift value as the target temperature.

[0025] In the air conditioner of an 11th aspect according to the present disclosure, in the eighth aspect or 10th aspect, the shift value may include a month information shift. The air-conditioning storage may further store a first collation table of the month information and the month information shift. The air-conditioning controller may acquire the month information, and may acquire the month information shift by collating the month information with the first collation table.

[0026] In the air conditioner of a 12th aspect according to the present disclosure, in the eighth aspect or 10th aspect, the shift value may include a feedback shift. The feedback shift may be input by the user regarding comfort of the control space via a terminal relevant to the air conditioner. The air-conditioning controller may acquire the feedback shift from the terminal.

[0027] In the air conditioner of a 13th aspect according to the present disclosure, in the eighth aspect or 10th aspect, the shift value may include a solar irradiance amount shift. The air conditioner may further include a solar irradiance sensor that detects a solar irradiance amount received by the control space. The air-conditioning storage may further store a second collation table of the solar irradiance amount and the solar irradiance amount shift. The air-conditioning controller may acquire the solar irradiance amount by the solar irradiance sensor, and may acquire the solar irradiance amount shift by collating the solar irradiance amount with the second collation table.

[0028] In the air conditioner of a 14th aspect according to the present disclosure, in the eighth aspect or 10th aspect, the shift value may include an activity amount

shift. The air conditioner may further include an activity amount sensor that detects a user activity amount in the control space. The air-conditioning storage may further store a third collation table of the activity amount and the activity amount shift. The air-conditioning controller may acquire the activity amount by the activity amount sensor, and may acquire the activity amount shift by collating the activity amount with the third collation table.

[0029] In the air conditioner of a 15th aspect according to the present disclosure, in any one of the first to 14th aspects, when determining the target temperature based on the first temporary target temperature, the air-conditioning controller may determine whether or not the first temporary target temperature falls within a predetermined settable range, may determine the first temporary target temperature as the target temperature when the first temporary target temperature falls within the predetermined settable range, and may determine a maximum value or a minimum value of the predetermined settable range as the target temperature when the first temporary target temperature is not included in the predetermined settable range.

[0030] A target temperature determination method of a 16th aspect according to the present disclosure can determine an appropriate target temperature for a control space to be subjected to air-conditioning control. The target temperature determination method includes: acquiring an external air temperature of the control space; acquiring a temperature range including a heating range, an intermediate range, and a cooling range, and acquiring a temperature determination criterion including a heating determination criterion and a cooling determination criterion, in which the heating determination criterion defines a first relationship between an external air temperature falling within the heating range and the intermediate range, and a first temporary target temperature, and the cooling determination criterion defines a second relationship between an external air temperature falling within the cooling range and the intermediate range, and the first temporary target temperature; determining as to which of the heating range, the intermediate range, and the cooling range of the temperature range the external air temperature falls within; determining the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined temperature range; and determining the target temperature based on the first temporary target temperature.

[0031] In the target temperature determination method of a 17th aspect according to the present disclosure, in the 16th aspect, determining the first temporary target temperature may include determining a second temporary target temperature based on the external air temperature, the heating determination criterion, and the cooling determination criterion, determining a heating mode or a cooling mode as an operation mode based on the external air temperature and the second temporary target temperature, and determining the first temporary

target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined operation mode.

[0032] In the target temperature determination method of an 18th aspect according to the present disclosure, in the 16th aspect or the 17th aspect, determining the target temperature may include acquiring a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space, and determining a sum of the first temporary target temperature and the shift value as the target temperature.

[0033] A program of a 19th aspect according to the present disclosure causes an air conditioner to execute the target temperature determination method of any of the 16th to 18th aspects.

[0034] A storage medium of a 20th aspect according to the present disclosure is a non-transitory computer-readable storage medium storing a computer program including the program of the 19th aspect. In the storage medium, when the computer program is executed by a processor, the target temperature determination method is implemented.

<<Technical concept>>

[0035] Prior to describing a specific exemplary embodiment of an air conditioner, a target temperature determination method, a program, and a storage medium according to the present disclosure, first, a technical concept described in the present disclosure will be described with reference to an example. In this example, the air conditioner acquires the external air temperature of the control space to be subjected to the air-conditioning control, and determines the target temperature of the air-conditioning control based on the external air temperature. Specifically, the temperature range is divided into the heating range, the intermediate range, and the cooling range with respect to the external air temperature. The temperature determination criterion, which is a criterion for determining the target temperature, includes the heating determination criterion and the cooling determination criterion. In this example, the heating determination criterion corresponds to the heating mode, the heating range, and the intermediate range, and the cooling determination criterion corresponds to the cooling mode, the cooling range, and the intermediate range. The air conditioner determines as to which of the temperature ranges an acquired external air temperature falls within, and determines a target temperature using the temperature determination criterion corresponding to the determined temperature range. Use of such the temperature determination criterion can automatically determine a target temperature comfortable for the user even in winter, summer, or an intermediate period (e.g., April, May, and October) neither winter nor summer. The air conditioner can notify a terminal such as an applica-

tion and a remote controller relevant to the air conditioner of the automatically determined target temperature, and cause the terminal to present the target temperature to the user. If the target temperature determined by the air conditioner is presented via the terminal, the reliability that the user has for automatic control can be enhanced.

[0036] Each of the exemplary embodiments described below illustrates an example of the present disclosure. Numerical values, shapes, configurations, steps, and orders of the steps, and the like illustrated in each of the following exemplary embodiments are merely examples, and thus are not intended to limit the present disclosure. Among the constituent elements in the following first exemplary embodiment, constituent elements not recited in the independent claim indicating the highest concept are described as optional constituent elements.

[0037] In each of the exemplary embodiments to be described below, modifications may be illustrated for specific elements, and an appropriate combination of any configurations is included for other elements, and each effect is achieved in the combined configuration. In the exemplary embodiments, the configurations of the modifications are combined, whereby the effects of the modifications are obtained.

[0038] In the following detailed description, the terms "first", "second", and the like are only used for description, and should not be understood as explicitly or implying relative importance or a rank of a technical feature. Features limited to "first" and "second" are intended to explicitly or implicitly indicate inclusion of one or more such features.

<<First exemplary embodiment>>

[0039] The first exemplary embodiment of an air conditioner, a target temperature determination method for the air conditioner, a program, and a storage medium according to the present disclosure will be described below in detail with reference to the drawings as appropriate.

[0040] Fig. 1A is a block diagram of an example of the air conditioner in the first exemplary embodiment, and Fig. 1B is a block diagram of an example of a use environment of the air conditioner in the first exemplary embodiment.

[0041] Air conditioner 10 illustrated in Fig. 1A includes air-conditioning storage 11, air-conditioning controller 12, and air-conditioning communicator 13. Air conditioner 10 may further include at least one of various sensors 14 to exert functions. Air conditioner 10 may include a display, a speaker, or a buzzer for displaying visual or auditory information to the user.

[0042] Air conditioner 10 can be connected to at least one of terminal 20 or server 30 via air-conditioning communicator 13. For example, as described later, air conditioner 10 may be connected to server 30 related to air conditioner 10 via the Internet. Air conditioner 10 may be connected to terminal 20a, which is a smartphone of the

user of air conditioner 10, via the Internet. Air conditioner 10 may be connected to terminal 20b, which is a remote controller of air conditioner 10, via infrared rays. In the present disclosure, terminal 20a and terminal 20b may be collectively called terminal 20. Air conditioner 10 may further be directly or indirectly connected to external information source 40 to acquire part of information necessary for air-conditioning control, such as an external air temperature, from external information source 40.

[0043] Hereinafter, an outline of each constituent element will be described.

<Air conditioner 10>

[0044] Air conditioner 10 assumes an inner space of a room in a house or an office, for example, as a control space to be subjected to air-conditioning control. Air conditioner 10 has at least one of a cooling function, a heating function, and an air cleaning function, for example. Air conditioner 10 may include a ventilator that introduces outdoor air outside the control space into the control space. The operation mode on the air-conditioning function includes at least a cooling mode and a heating mode. Furthermore, air conditioner 10 may have operation modes such as a dehumidifying mode, a humidifying mode, an air blowing mode, and a ventilation mode, and these functions and operation modes can be freely combined (e.g., a heating/humidifying function, a cooling/ventilation mode, and the like).

<Air-conditioning storage 11>

[0045] Air-conditioning storage 11 is a recording medium that records various types of information and control programs, and may be a memory that functions as a work area of air-conditioning controller 12. Air-conditioning storage 11 is implemented by, for example, a flash memory, a random access memory (RAM), a read only memory (ROM), another storage device, or an appropriate combination thereof.

[0046] Air-conditioning storage 11 may store a criterion for air-conditioning control, a threshold, and a collation table. For example, air-conditioning storage 11 may store a temperature range and a temperature determination criterion described later. Air-conditioning storage 11 may store information acquired from each sensor 14. Information acquired from server 30 or external information source 40 may also be stored in air-conditioning storage 11. These pieces of information can be read by air-conditioning controller 12 when the target temperature determination method or the notification method for notifying terminal 20 of the target temperature is executed.

[0047] Air-conditioning storage 11 may store a program (computer program) for causing air-conditioning controller 12 to execute the target temperature determination method or the notification method.

<Air-conditioning controller 12>

[0048] Air-conditioning controller 12 is a controller that controls at least some functions of air conditioner 10. Air-conditioning controller 12 includes a general-purpose processor such as a central processing unit (CPU), a micro processing unit (MPU), a micro controller unit (MCU), a field programmable gate array (FPGA), a digital signal processor (DSP), or an application specific integrated circuit (ASIC) that implements a predetermined function by executing a program. Air-conditioning controller 12 can implement various controls in air conditioner 10 by calling and executing a control program stored in air-conditioning storage 11. Air-conditioning controller 12 can read data stored in air-conditioning storage 11 and write data into air-conditioning storage 11 in cooperation with air-conditioning storage 11. Air-conditioning controller 12 is not limited to one that implements a predetermined function by cooperation of hardware and software, and may be a hardware circuit designed exclusively for implementing a predetermined function.

[0049] Air-conditioning controller 12 can communicate with server 30 via air-conditioning communicator 13. Similarly, air-conditioning controller 12 can receive, from terminal 20, various commands and setting values (e.g., a start command of automatic operation of air conditioner 10) by the user via air-conditioning communicator 13. Air-conditioning controller 12 controls each component of air conditioner 10 so as to exert the cooling function and the heating function of air conditioner 10 based on these setting values and detection values (e.g., external air temperature) received from the various sensors 14.

<Air-conditioning communicator 13>

[0050] Air-conditioning communicator 13 can also communicate with server 30, terminal 20, and the like, and can also transmit and receive Internet packets, for example. As described above, air-conditioning controller 12 may cooperate with at least one of server 30 or terminal 20 via air-conditioning communicator 13. Air-conditioning communicator 13 may transmit and receive data by performing communication in accordance with standards such as Wi-Fi (registered trademark), IEEE802.2, IEEE802.3, the third generation mobile communication system (3G), or long term evolution (LTE) among server 30, air conditioner 10, and terminal 20. In addition to the Internet, air-conditioning communicator 13 may perform communication using an intranet, an extra network, a local area network (LAN), an integrated services digital network (ISDN), a value added network (VAN), a cable television (CATV) communication network, a virtual dedicated network, a telephone line network, a mobile communication network, a satellite communication network, infrared rays, and Bluetooth (registered trademark).

<Sensor 14>

[0051] Sensor 14 is for acquiring various types of information from the outside of air conditioner 10 in order to exert the function of air conditioner 10. In particular, sensor 14 can acquire information for performing air-conditioning control.

[0052] For example, sensor 14 includes indoor temperature sensor 14a that detects a temperature inside a room (i.e., control range of air-conditioning control) provided with air conditioner 10, and external air temperature sensor 14b that detects an external air temperature outside the control range. Sensor 14 may further include at least one of solar irradiance sensor 14c that detects a solar irradiance amount received by the control space and activity amount sensor 14d that detects a user activity amount in the control space. Information detected by sensor 14 is input to and stored in air-conditioning storage 11, and is then used by air-conditioning controller 12 or transmitted to terminal 20 or server 30.

[0053] Sensor 14 may be mounted on a body of air conditioner 10, or may be mounted on other home electric appliances or on any place inside and outside a smart home. Sensor 14 may be mounted on a device such as air conditioner 10 or may be an independent sensor device. When executing the target temperature determination method, air-conditioning controller 12 can acquire, from sensors 14, information used for control regardless of the mounting location of sensors 14.

<Terminal 20>

[0054] Terminal 20 is a device relevant to air conditioner 10. In the present exemplary embodiment, terminal 20 includes terminal 20a, which is an information terminal connected to air conditioner 10 via the Internet or server 30. Terminal 20 can include terminal 20b, which is a remote controller connected to air conditioner 10 via infrared rays or Bluetooth (registered trademark). Terminal 20a may be an information terminal that can perform data communication with air conditioner 10, for example, a smartphone, a cellular phone, a mobile phone, a tablet, a wearable device, a computer, or the like with built-in dedicated relevant application 25. Terminal 20b may be, for example, a remote controller that manages and controls only air conditioner 10, or may be a remote controller that can manage and control a plurality of types of home electrical appliances simultaneously.

[0055] Terminal 20 can acquire a setting or a command input by the user and transfer the acquired setting or command to air conditioner 10 or server 30. On the other hand, terminal 20 can acquire information such as the target temperature from air conditioner 10 or server 30 and present the acquired information to the user.

<Server 30>

[0056] Server 30 is a server for providing update firm-

ware to at least one air conditioner 10, but may be used for other purposes. For example, server 30 may be a management server of a manufacturer of air conditioner 10 for managing the at least one air conditioner 10 or for collecting data. Alternatively, server 30 may be an application server. Server 30 can acquire the external air temperature of the control space of the specific air conditioner 10 from external information source 40 via the Internet and notify the specific air conditioner 10 of the acquired external air temperature. Server 30 can receive, from the specific air conditioner 10, information regarding the target temperature determined by the specific air conditioner 10 and transfer the received target temperature to terminal 20a relevant to the specific air conditioner 10.

<External information source 40>

[0057] External information source 40 is an information source that provides information regarding services not directly involved with air conditioner 10, for example, weather information or information regarding air quality in a specific region. For example, external information source 40 may be a website of the Meteorological Agency. Server 30 may transfer, to air conditioner 10 or terminal 20, information acquired from external information source 40. Air conditioner 10 may be directly connected to external information source 40 to acquire part of the information necessary for air-conditioning control from external information source 40, or may be indirectly connected to external information source 40 via server 30 or terminal 20 to acquire necessary information.

[0058] The configuration of air conditioner 10 according to the present exemplary embodiment has been schematically described so far. From now on, features of the target temperature determination method, the program, and the storage medium executed by air conditioner 10 according to the present exemplary embodiment will be described.

<Target temperature determination method>

[0059] Air-conditioning controller 12 executes the air-conditioning control and the target temperature determination method of air conditioner 10. According to the target temperature determination method, an appropriate target temperature can be automatically determined for the control space to be subjected to air-conditioning control.

[0060] Fig. 2 is a flowchart of an example of the target temperature determination method in the first exemplary embodiment, and in this example, the target temperature determination method includes steps S100 to S500.

[0061] Air-conditioning controller 12 may determine the target temperature by executing steps S 100 to S500 when air conditioner 10 starts the automatic operation in response to a user command.

[0062] In the target temperature determination method, air-conditioning controller 12 acquires the external air temperature of the control space (step S100). For example, air-conditioning controller 12 causes external air temperature sensor 14b to detect the external air temperature of the control space, and acquires a detection result from the external air temperature sensor. Air-conditioning controller 12 may acquire the external air temperature from server 30 or external information source 40 via the Internet.

[0063] Air-conditioning controller 12 acquires the temperature range and the temperature determination criterion (step S200). Air-conditioning controller 12 can acquire the temperature range and the temperature determination criterion by reading the temperature range and the temperature determination criterion from air-conditioning storage 11 or by receiving the temperature range and the temperature determination criterion from server 30.

[0064] The temperature range is a range with respect to the external air temperature, and is divided into the heating range, the intermediate range, and the cooling range. Basically, during the automatic operation, air-conditioning controller 12 determines the heating mode as the operation mode when the external air temperature falls within the heating range, and determines the cooling mode as the operation mode when the external air temperature falls within the cooling range. When the external air temperature falls within the intermediate range, air-conditioning controller 12 determines the heating mode or the cooling mode as the operation mode as described later.

[0065] The temperature determination criterion is a criterion for determining the target temperature, and includes the heating determination criterion and the cooling determination criterion. The heating determination criterion is a criterion for determining the target temperature when the operation mode is the heating mode, and the cooling determination criterion is a criterion for determining the target temperature when the operation mode is the cooling mode. Therefore, it can be said that the heating mode corresponds to the heating determination criterion and the cooling mode corresponds to the cooling determination criterion. The temperature determination criterion defines a relationship between the external air temperature and the first temporary target temperature. The heating determination criterion corresponds to at least the heating range and the intermediate range, and the cooling determination criterion corresponds to at least the cooling range and the intermediate range. The first temporary target temperature refers to a temporarily targeted temperature.

[0066] Fig. 3 is an example of the temperature determination criterion in the first exemplary embodiment. In the example of Fig. 3, two external air temperature thresholds of X°C and Y°C are defined with respect to the external air temperature. The heating range is defined as a range of less than or equal to X°C, the inter-

mediate range is defined as a range of higher than $X^{\circ}\text{C}$ and less than or equal to $Y^{\circ}\text{C}$, and the cooling range is defined as a range of higher than or equal to $Y^{\circ}\text{C}$.

[0067] In the example illustrated in Fig. 3, the heating determination criterion corresponds to the heating range and the intermediate range, and the cooling determination criterion corresponds to the cooling range and the intermediate range. The heating determination criterion defines the first relationship between the external air temperature falling within the heating range and the intermediate range and the first temporary target temperature. The cooling determination criterion defines the second relationship between the external air temperature falling within the cooling range and the intermediate range and the first temporary target temperature. When the external air temperature falling within the heating range or the intermediate range is collated with the heating determination criterion (first relationship), the first temporary target temperature corresponding to the external air temperature is obtained. When the external air temperature falling within the cooling range or the intermediate range is collated with the cooling determination criterion (second relationship), the first temporary target temperature corresponding to the external air temperature is obtained. Since the heating determination criterion and the cooling determination criterion are different, basically, when the same external air temperature is collated with each of the heating determination criterion and the cooling determination criterion, different first temporary target temperatures are obtained.

[0068] As illustrated in Fig. 3, both the heating determination criterion and the cooling determination criterion correspond to all of the heating range, the intermediate range, and the cooling range. In this case, each of the heating determination criterion and the cooling determination criterion defines the first relationship and the second relationship between the external air temperature falling within all the temperature ranges and the first temporary target temperature.

[0069] In the example illustrated in Fig. 3, the heating determination criterion defines the following first relationship. That is, when the external air temperature is less than or equal to external air temperature threshold $A1^{\circ}\text{C}$, the first temporary target temperature is temperature $B1^{\circ}\text{C}$. When the external air temperature is higher than external air temperature threshold $A1^{\circ}\text{C}$ and less than or equal to external air temperature threshold $A2^{\circ}\text{C}$, the first temporary target temperature is a temperature corresponding to the external air temperature with a constant gradient between temperature $B1^{\circ}\text{C}$ and temperature $B2^{\circ}\text{C}$. When the external air temperature is higher than external air temperature threshold $A2^{\circ}\text{C}$, the first temporary target temperature is temperature $B2^{\circ}\text{C}$. Similarly, in the example of Fig. 3, the cooling determination criterion defines the following first relationship. That is, when the external air temperature is less than or equal to external air temperature threshold $A3^{\circ}\text{C}$, the first temporary target temperature is temperature $B3^{\circ}\text{C}$. When

the external air temperature is higher than external air temperature threshold $A3^{\circ}\text{C}$ and less than or equal to external air temperature threshold $A4^{\circ}\text{C}$, the first temporary target temperature is a temperature corresponding to the external air temperature with a constant gradient between temperature $B3^{\circ}\text{C}$ and temperature $B4^{\circ}\text{C}$. When the external air temperature is higher than external air temperature threshold $A4^{\circ}\text{C}$, the first temporary target temperature is temperature $B4^{\circ}\text{C}$.

[0070] In the temperature determination criterion, external air temperature threshold Y is higher than external air temperature threshold X , external air temperature threshold $A3$ is higher than external air temperature threshold $A1$, external air temperature threshold $A4$ is higher than external air temperature threshold $A2$, temperature $B3$ is higher than temperature $B1$, and temperature $B4$ is higher than temperature $B2$. For example, X may be a temperature in a range from 5°C to 15°C inclusive, and Y may be a temperature in a range from 20°C to 30°C inclusive. External air temperature threshold $A1$ may be a temperature in a range from 0°C to 12°C inclusive, external air temperature threshold $A2$ may be a temperature in a range from 13°C to 18°C inclusive, external air temperature threshold $A3$ may be a temperature in a range from 19°C to 24°C inclusive, and external air temperature threshold $A4$ may be a temperature in a range from 26°C to 35°C inclusive. Note that the shape of a line of the temperature determination criterion and the number of external air temperature thresholds are not limited to this.

[0071] The temperature determination criterion may be generated based on a feedback history when a user feels comfortable in the control space. The feedback history includes a set temperature (user set temperature) and an external air temperature when the user feels comfortable. For example, the user can notify air conditioner 10 or server 30 that the user feels comfortable via relevant application 25 of terminal 20a. At that time, terminal 20a also transmits the set temperature at that time point to air conditioner 10 or server 30. Air conditioner 10 or server 30 acquires the external air temperature at that time, and writes the external air temperature into the feedback history together with the received set temperature and the acquired external air temperature. The feedback history may include other information such as the operation mode at that time, the blown air volume at that time, the indoor humidity at that time, and the model of air conditioner 10.

[0072] Air conditioner 10 or server 30 may generate the temperature determination criterion based on a plot diagram in which the mode of the set temperatures with respect to the external air temperature when the user feels comfortable is plotted. In place of the mode, a mean value, a weighted mean value, or a median of the set temperature may be used to generate the temperature determination criterion. Air conditioner 10 or server 30 may generate a temperature determination criterion applicable throughout the year, or may generate a tempera-

ture determination criterion appropriate for each season or each month based on a feedback history for a specific period. Note that the temperature determination criterion can be implemented in the form of a collation table or a mathematical expression, for example.

[0073] After acquiring the external air temperature, air-conditioning controller 12 determines as to which of the heating range, the intermediate range, or the cooling range of the temperature range the external air temperature falls within (step S300). For example, air-conditioning controller 12 determines the temperature range including the external air temperature by comparing the acquired external air temperature with the external air temperature thresholds X and Y.

[0074] Next, air-conditioning controller 12 determines the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to the determined temperature range (step S400). More specifically, after determining the operation mode based on the external air temperature, air-conditioning controller 12 determines the first temporary target temperature.

[0075] Fig. 4 is a flowchart of an example of step S400 in a case of the heating range in the first exemplary embodiment. If the external air temperature falls within the heating range, air-conditioning controller 12 determines the heating mode as the operation mode (step S410). Air-conditioning controller 12 then determines the first temporary target temperature based on the external air temperature and the heating determination criterion (step S411). For example, air-conditioning controller 12 determines the first temporary target temperature by collating the external air temperature with the heating determination criterion (first relationship).

[0076] Fig. 5 is a flowchart of an example of step S400 in a case of the cooling range in the first exemplary embodiment. If the external air temperature falls within the cooling range, air-conditioning controller 12 determines the cooling mode as the operation mode (step S420). Air-conditioning controller 12 then determines the first temporary target temperature based on the external air temperature and the cooling determination criterion (step S421). For example, air-conditioning controller 12 determines the first temporary target temperature by collating the external air temperature with the cooling determination criterion (second relationship).

[0077] Fig. 6 is a flowchart of an example of step S400 in a case of the intermediate range in the first exemplary embodiment. If the external air temperature falls within the intermediate range, air-conditioning controller 12 determines the second temporary target temperature based on the external air temperature, the heating determination criterion, and the cooling determination criterion (step S430). The second temporary target temperature refers to a temporarily targeted temperature for determining the operation mode when the external air temperature falls within the intermediate range.

[0078] Air-conditioning controller 12 may determine,

as the second temporary target temperature, a mean value of the first temporary target temperature that the external air temperature corresponds to in the heating determination criterion and the first temporary target temperature that the external air temperature corresponds to in the cooling determination criterion. As described above, since the heating determination criterion and the cooling determination criterion are different, when the same external air temperature is collated with each of the heating determination criterion and the cooling determination criterion, different first temporary target temperatures are obtained. Air-conditioning controller 12 may set, as the second temporary target temperature, the mean value of the two first temporary target temperatures obtained based on each of the heating determination criterion and the cooling determination criterion. In place of the mean value, a weighted mean value, a maximum value, or a minimum value of the two first temporary target temperatures may be determined as the second temporary target temperature.

[0079] Next, air-conditioning controller 12 determines the heating mode or the cooling mode as the operation mode based on the external air temperature and the second temporary target temperature (step S431). Then, air-conditioning controller 12 determines the final first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to the determined operation mode (step S432). In step S432, air-conditioning controller 12 determines the final first temporary target temperature based on the external air temperature and the heating determination criterion or the cooling determination criterion in the same manner as in step S411 or step S421.

[0080] That is, in step S400, air-conditioning controller 12 temporarily acquires the two first temporary target temperatures in accordance with the heating determination criterion and the cooling determination criterion in step S430. Thereafter, air-conditioning controller 12 determines the second temporary target temperature using the two first temporary target temperatures, and further determines the final first temporary target temperature based on the second temporary target temperature.

[0081] In step S431, air-conditioning controller 12 determines the operation mode based on the external air temperature and the second temporary target temperature. More specifically, air-conditioning controller 12 determines the operation mode based on the external air temperature and a temperature difference (i.e., a result of subtracting the second temporary target temperature from the indoor temperature) between the indoor temperature and the second temporary target temperature. Hereinafter, the determination method of the operation mode will be described in more detail. Fig. 7 is a flowchart of an example of step S431 in the first exemplary embodiment.

[0082] Air-conditioning controller 12 acquires the indoor temperature by indoor temperature sensor 14a (step S4311) and acquires the mode determination cri-

terion (step S4312). Air-conditioning controller 12 can acquire the mode determination criterion by reading the mode determination criterion from air-conditioning storage 11 or by receiving the mode determination criterion from server 30. Air-conditioning controller 12 then determines the heating mode or the cooling mode as the operation mode based on the external air temperature, the second temporary target temperature, the indoor temperature, and the mode determination criterion (step S4313).

[0083] The mode determination criterion is a criterion for determining an operation mode, and is a combination of at least one external air temperature threshold and at least one temperature difference threshold. The external air temperature threshold is relevant to the external air temperature, and the temperature difference threshold is relevant to the temperature difference between the indoor temperature and the second temporary target temperature.

[0084] Fig. 8A illustrates an example of the mode determination criterion in the first exemplary embodiment. In Fig. 8A, the horizontal axis represents the external air temperature (unit: °C), and the vertical axis represents the temperature difference (unit: °C). As viewed from the horizontal axis, the mode determination criterion of Fig. 8A includes a first external air temperature threshold T1 and second external air temperature threshold T2. Three temperature ranges RT1 to RT3 are defined by the first external air temperature threshold T1, second external air temperature threshold T2, and appropriate uppermost and lowermost limit values (e.g., a lowermost limit value of -50°C and an uppermost limit value of a numerical expression upper limit, but not limited to them). More specifically, first temperature range RT1 is defined as a range higher than the lowermost limit value and less than or equal to the first external air temperature threshold T1, second temperature range RT2 is defined as a range higher than the first external air temperature threshold T1 and less than or equal to second external air temperature threshold T2, and third temperature range RT3 is defined as a range higher than second external air temperature threshold T2 and less than or equal to the uppermost limit value. As viewed from the vertical axis, the mode determination criterion of Fig. 8A includes first temperature difference threshold D1. First temperature difference threshold D1 and suitable uppermost and lowermost limit values (e.g., a lowermost limit value of -50°C and an uppermost limit value of +50°C, but not limited to them) define first temperature difference range RD1, which is higher than the lowermost limit value and less than or equal to first temperature difference threshold D1, and second temperature difference range RD2, which is greater than first temperature difference threshold D1 and less than or equal to the uppermost limit value. The mode determination criterion can be stored in air-conditioning storage 11 or server 30 in the form of a collation table including all thresholds, for example.

[0085] In the mode determination criterion, the operation mode can be set for a combination of each of the temperature ranges RT and each of the temperature difference ranges. For example, in the mode determination criterion of Fig. 8A, the combination of the temperature range RT2 and first temperature difference range RD1 corresponds to the heating mode, and the combination of second temperature range RT2 and second temperature difference range RD2 is set to correspond to the cooling mode. The operation mode corresponding to a combination of each of the temperature ranges RT and each of the temperature difference ranges can also be stored in air-conditioning storage 11 or server 30 in the form of a collation table or the like.

[0086] Air-conditioning controller 12 can determine the operation mode using the mode determination criterion of Fig. 8A. For example, if the external air temperature falls within first temperature range RT1, that is, if the external air temperature is less than or equal to the first external air temperature threshold T1, air-conditioning controller 12 determines the heating mode as the operation mode. If the external air temperature falls within third temperature range RT3, that is, if the external air temperature is higher than second external air temperature threshold T2, air-conditioning controller 12 determines the cooling mode as the operation mode. If the external air temperature falls within second temperature range RT2, that is, if the external air temperature is higher than the first external air temperature threshold T1 and less than or equal to second external air temperature threshold T2, air-conditioning controller 12 determines the operation mode based also on the calculated temperature difference. If the external air temperature falls within second temperature range RT2 and the temperature difference is less than or equal to first temperature difference threshold D1, air-conditioning controller 12 determines the heating mode as the operation mode. On the other hand, when the external air temperature falls within second temperature range RT2 and the temperature difference is greater than first temperature difference threshold D1, air-conditioning controller 12 determines the cooling mode as the operation mode.

[0087] Fig. 8B illustrates an example of the mode determination criterion in the first exemplary embodiment. In the mode determination criterion illustrated in Fig. 8B, on the horizontal axis, first temperature range RT1 to a fourth temperature range RT4 are defined by the first external air temperature threshold T1 to third external air temperature threshold T3. On the vertical axis, first temperature difference range RD 1 to a fourth temperature difference range RD4 are defined by first temperature difference threshold D1 to third temperature difference threshold D3.

[0088] For example, external air temperature threshold T1 may be a temperature in a range from 12°C to 14°C inclusive, external air temperature threshold T2 may be a temperature in a range from 14°C to 22°C inclusive, and external air temperature threshold T3 may be a tempera-

ture in a range from 26°C to 30°C inclusive. External air temperature threshold T2 can also be defined for each season or each month. Temperature difference threshold D1 may be a temperature difference in a range from -6°C to -3°C inclusive, temperature difference threshold D2 may be a temperature difference in a range from -2°C to 2°C inclusive, and temperature difference threshold D3 may be a temperature difference in a range from 36°C to 40°C inclusive.

[0089] As described above, one mode determination criterion can also be said to be a combination of a plurality of external air temperature thresholds T and a plurality of temperature difference thresholds D. One mode determination criterion can also be said to be a set of combinations of any one of the plurality of temperature ranges RT and any one of the plurality of temperature difference ranges RD. Each combination of these ranges may correspond to the heating mode or the cooling mode. For example, in the mode determination criterion of Fig. 8B, the combination of first temperature range RT1 and first temperature difference range RD1 corresponds to the heating mode, the combination of second temperature range RT2 and second temperature difference range RD2 corresponds to the heating mode, the combination of the fourth temperature range RT4 and first temperature difference range RD1 corresponds to the cooling mode, and the combination of third temperature range RT3 and second temperature difference range RD2 corresponds to the cooling mode. The correspondence relationship between the combination and the operation mode can be stored in air-conditioning storage 11 or server 30 in the form of a collation table.

[0090] Air-conditioning controller 12 can determine the operation mode using the mode determination criterion of Fig. 8B or another mode determination criterion in the same manner as determining the operation mode using the mode determination criterion of Fig. 8A. In steps S430 and S431, use of the second temporary target temperature and such a mode determination criterion can determine a suitable operation mode even in an intermediate period neither winter nor summer. When the mode determination criterion is prepared for each season or each month, the operation mode can be more appropriately determined by selecting the corresponding mode determination criterion in accordance with the current season or month. In step S400, the first temporary target temperature is determined based on an appropriate temperature determination criterion for each temperature range, and therefore an appropriate first temporary target temperature can be automatically determined in any season.

[0091] After determining the first temporary target temperature based on the operation mode and the temperature determination criterion suitable for the external air temperature, air-conditioning controller 12 determines the target temperature based on the first temporary target temperature (step S500). For example, air-conditioning controller 12 determines the first temporary target tem-

perature as it is as the target temperature. Air-conditioning controller 12 may determine, as the target temperature, a result of adjusting the first temporary target temperature based on the environmental state of the control space, the state of the user, or the preference of the user. Air-conditioning controller 12 may determine, as the target temperature, a result of adjusting the first temporary target temperature to fall within a predetermined range.

[0092] Fig. 9 is a flowchart of an example of step S500 in the first exemplary embodiment. In the example of Fig. 9, air-conditioning controller 12 adjusts the first temporary target temperature to fall within the predetermined range.

[0093] In step S500, air-conditioning controller 12 determines whether or not the first temporary target temperature falls within a predetermined settable range (step S510). The settable range is generally a range in which the user does not feel uncomfortable, and may be, for example, in a range from 14°C to 32°C inclusive, in a range from 16°C to 30°C inclusive, or in a range from 18°C to 28°C inclusive.

[0094] If the first temporary target temperature falls within the settable range, air-conditioning controller 12 determines the first temporary target temperature as the target temperature (step S511). On the other hand, if the first temporary target temperature is not included in the settable range, air-conditioning controller 12 determines the maximum value or the minimum value in the settable range as the target temperature (step S512). For example, when the first temporary target temperature is higher than the maximum value in the settable range, air-conditioning controller 12 determines the maximum value in the settable range as the target temperature. When the first temporary target temperature is less than or equal to the minimum value in the settable range, air-conditioning controller 12 determines the minimum value in the settable range as the target temperature.

[0095] This can ensure that the target temperature is automatically determined in a range where the user does not feel uncomfortable.

[0096] Air-conditioning controller 12 completes the processing of automatic determination of the target temperature by executing step S500 at least once. Use of an appropriate temperature determination criterion can automatically determine a target temperature comfortable for the user even in winter, summer, or an intermediate period neither winter nor summer.

[0097] Note that in the automatic operation, air-conditioning controller 12 may repeatedly execute step S100 to step S500. Air-conditioning controller 12 can maintain the comfort of the control space by executing step S100 to step S500 at regular time intervals (e.g., every 10 minutes, every 20 minutes, every 30 minutes, every 60 minutes, or every 90 minutes).

[0098] Air-conditioning controller 12 has a program to be used to execute the target temperature determination method described above. The program causes air-conditioning controller 12 of air conditioner 10 to execute the

target temperature determination method.

[0099] Air conditioner 10 includes a non-transitory computer-readable storage medium storing a computer program including a program used to execute the target temperature determination method. When the computer program is executed by the processor (air-conditioning controller 12), the target temperature determination method of the present disclosure is implemented. The storage medium may be the same as air-conditioning storage 11 of air conditioner 10, may be included in air-conditioning storage 11, or may be a component different from air-conditioning storage 11.

<<Second exemplary embodiment>>

[0100] In the second exemplary embodiment, in step S500, air-conditioning controller 12 determines, as the target temperature, a result of adjusting (shifting) the first temporary target temperature based on the environmental state of the control space, the state of the user, or the preference of the user. For example, air-conditioning controller 12 can shift the first temporary target temperature based on month information regarding the current calendar month, a user feedback, a solar irradiance amount being received in the control space, or a user activity amount in the control space.

[0101] Similarly, in step S430, air-conditioning controller 12 can determine the second temporary target temperature in consideration of the environmental state of the control space and the like. If the second temporary target temperature adjusted (shifted) based on the environmental state or the like of the control space is used, the operation mode can be more appropriately determined when the external air temperature falls within the intermediate range.

<Determination of target temperature in consideration of shift value>

[0102] Fig. 10 is a flowchart of an example of step S500 in the second exemplary embodiment. Air-conditioning controller 12 acquires a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space (step S520). The shift value includes at least one of a month shift by month information regarding a current calendar month, a feedback shift by a user feedback, a solar irradiance amount shift by a solar irradiance amount received by the control space, and an activity amount shift by a user activity amount in the control space. These shift values will be described in detail later.

[0103] Air-conditioning controller 12 determines the sum of the first temporary target temperature and the acquired shift value as the target temperature (step S521). That is, the target temperature is a result of adding the shift value to the first temporary target temperature. In

place of the sum of the first temporary target temperature and the shift value, a weighted sum or a product of the first temporary target temperature and the shift value may be determined as the target temperature.

<<Month information shift>>

[0104] The shift value may include a month information shift. The month information is related to a current calendar month. For example, air-conditioning controller 12 may acquire the current date and set the "month" part of the date as the month information. Note that although not necessary, the month information may have information regarding year and day on the calendar. Air-conditioning controller 12 may directly acquire the month information from air-conditioning storage 11, terminal 20, or server 30, or may acquire data such as the current date from which the month information can be extracted and extract the month information from the data.

[0105] When the month information shift is used, air-conditioning storage 11 further stores the first collation table of the month information and the month information shift. The first collation table may include shift values corresponding for each month or each season. When the year is divided into a plurality of periods, and one period includes one or more months, the first collation table may include a shift value corresponding to each period. In one example, the first collation table indicates that the month information shift in the period from June to September is +0.5°C, the month information shift in the period from November to March is -0.5°C, and the month information shift in the period of April, May, and October is 0°C. The range of the month information shift may be, for example, in a range from -2°C to +2°C inclusive. The content of the first collation table may vary depending on the location (e.g., city, country, or region) of the control space of air conditioner 10. Air-conditioning controller 12 can acquire the month information shift by collating the acquired month information with the first collation table.

«Feedback shift»

[0106] The shift value may include a feedback shift. The feedback shift is based on feedback input by the user regarding comfort of the control space via terminal 20 relevant to air conditioner 10, and can also be said to be an adjustment value reflecting the user's preference.

[0107] For example, air-conditioning controller 12 causes terminal 20a as a smartphone of the user to display three feedback options of "just right", "cold", and "hot" via a user interface of terminal 20a to prompt the user to select. Terminal 20a transmits the feedback selected by the user via the user interface to air-conditioning controller 12.

[0108] For example, terminal 20b as a remote controller of air conditioner 10 is provided with buttons or other input elements corresponding to three feedbacks of "just right", "cold", and "hot". When these buttons are pressed

by the user, terminal 20a transmits the corresponding feedback to air-conditioning controller 12.

[0109] Air-conditioning controller 12 acquires the feedback shift by acquiring the feedback from terminal 20. For example, when receiving the feedback of "cold" via terminal 20, air-conditioning controller 12 adds 0.5°C to the feedback shift. When receiving the feedback of "hot", air-conditioning controller 12 subtracts 0.5°C from the feedback shift, and when receiving the feedback of "just right", air-conditioning controller 12 does not change the current feedback shift. Note that the feedback shift can be accumulated in response to a plurality of feedbacks, and can be accumulated in a range of, for example, -8°C to +8°C inclusive.

<<Solar irradiance amount shift>>

[0110] The shift value may include a solar irradiance amount shift. When the solar irradiance amount shift is used, air conditioner 10 further includes solar irradiance sensor 14c that detects a solar irradiance amount received by the control space. Solar irradiance sensor 14c is installed at a place where the solar irradiance amount received by the control space can be detected, and may be installed, for example, on the outer surface of the indoor unit or the outdoor unit of air conditioner 10. Air-conditioning controller 12 acquires the solar irradiance amount by solar irradiance sensor 14c. Solar irradiance sensor 14c may be mounted on air conditioner 10 or may be installed as an independent sensor.

[0111] When the solar irradiance amount shift is used, air-conditioning storage 11 further stores a second collation table of the solar irradiance amount and the solar irradiance amount shift. The second collation table includes a shift value corresponding to the solar irradiance amount. In the solar irradiance amount shift, for example, the solar irradiance amount is divided into a plurality of sections by at least one solar irradiance amount threshold, and the second collation table includes a shift value corresponding to the solar irradiance amount of each section.

[0112] In general, when the solar irradiance amount increases, the user in the control space tends to feel hot. Therefore, for example, the solar irradiance amount shift may be set lower as the solar irradiance amount increases so as to alleviate the heat felt due to the high solar irradiance amount. For example, the second collation table may indicate that the solar irradiance amount information shift corresponding to a solar irradiance amount less than or equal to a solar irradiance amount threshold is +1°C, and the solar irradiance amount information shift corresponding to a solar irradiance amount higher than the solar irradiance amount threshold is -1°C.

[0113] The range of the solar irradiance amount shift may be in a range of, for example, -3°C to +3°C inclusive. Air-conditioning controller 12 can acquire the solar irradiance amount shift by collating the acquired solar irra-

diance amount with the second collation table.

<<Activity amount shift>>

[0114] The shift value may include an activity amount shift. When the activity amount shift is used, air conditioner 10 further includes activity amount sensor 14d that detects a user activity amount in the control space. The activity amount refers to the intensity of a physical activity (exercise) of the user in kinematics. Activity amount sensor 14d may be, for example, a human detecting sensor, a camera, an infrared thermographic camera, or a distance sensor. Activity amount sensor 14d may be provided in air conditioner 10, terminal 20, the control space, or a wearable terminal or a smartwatch worn by the user. Air-conditioning controller 12 may acquire the user activity amount in the control space by directly receiving the activity amount from activity amount sensor 14d or by processing data received from activity amount sensor 14d. When there are a plurality of users in the control space, air-conditioning controller 12 may determine the activity amount shift by using a mean value or a maximum value of the activity amounts of the plurality of users or the user activity amount closest to air conditioner 10.

[0115] When the activity amount shift is used, air-conditioning storage 11 further stores a third collation table of the activity amount and the activity amount shift. The third collation table includes a shift value corresponding to the activity amount. In the activity amount shift, for example, the activity amount is divided into a plurality of sections by at least one activity amount threshold, and the third collation table includes a shift value corresponding to the activity amount in each section.

[0116] In general, the user feels hot as the activity amount gets high. Therefore, for example, the activity amount shift may be set lower as the activity amount increases so as to alleviate the heat felt due to the high activity amount. For example, the third collation table may indicate that the activity amount information shift corresponding to an activity amount less than or equal to an activity amount threshold is +1°C and the activity amount information shift corresponding to an activity amount higher than the activity amount threshold is -1°C.

[0117] The range of the activity amount shift may be in a range of, for example, -2°C to +2°C inclusive. Air-conditioning controller 12 can acquire the activity amount shift by collating the activity amount acquired by activity amount sensor 14d with the third collation table.

[0118] As described above, air-conditioning controller 12 can determine the target temperature by adding the at least one shift value described above to the first temporary target temperature. By considering the shift value depending on the environmental state or the like of the control space, the target temperature can be more appropriately determined, and the comfort in the control space can be enhanced.

<Determination of second temporary target temperature in consideration of shift value>

[0119] Also in step S430, air-conditioning controller 12 can determine the second temporary target temperature in consideration of the shift value described above.

[0120] Fig. 11 is a flowchart of an example of step S430 in the second exemplary embodiment. In step S430, as in the first exemplary embodiment, air-conditioning controller 12 first calculates a mean value of the first temporary target temperature that the external air temperature corresponds to in the heating determination criterion and the first temporary target temperature that the external air temperature corresponds to in the cooling determination criterion (step S4301).

[0121] Next, air-conditioning controller 12 acquires a shift value relevant to at least one of the month information, the user feedback, the solar irradiance amount in the control space, and the user activity amount as described above (step S4302). Air-conditioning controller 12 determines, as the second temporary target temperature, the sum of the mean value calculated in step S4301 and the shift value acquired in step S4302 (step S4303).

[0122] In place of the sum of the mean value calculated in step S4301 and the shift value, a weighted sum or a product of the mean value calculated in step S4301 and the shift value may be determined as the second temporary target temperature.

[0123] In step S4301, in place of the mean value, a weighted mean value, a maximum value, or a minimum value of the two first temporary target temperatures obtained by the heating determination criterion and the cooling determination criterion may be obtained. In this case, air-conditioning controller 12 determines the second temporary target temperature based on the weighted mean value, the maximum value, or the minimum value, and the shift value described above.

[0124] As described above, air-conditioning controller 12 determines the second temporary target temperature based on at least one shift value of the monthly shift, the feedback shift, the solar irradiance amount shift, and the activity amount shift. By considering the shift value depending on the environmental state or the like of the control space, the second temporary target temperature can be more appropriately determined, and furthermore, the target temperature can be more appropriately determined.

[0125] Note that the shift value acquired in step S4302 and the shift value acquired in step S520 may be the same or may be different.

[0126] The target temperature determination technique described in the first exemplary embodiment and the second exemplary embodiment can be combined by extracting elements as appropriate. Fig. 12 is a flowchart of an example of the target temperature determination method in the second exemplary embodiment, and illustrates an example in which the first exemplary embodiment and the second exemplary embodiment are com-

bined. Steps S100 to S300, S410 to S432, and S510 to S521 in Fig. 12 have the same content as that in steps denoted by the same reference numerals in Fig. 2, Fig. 4 to Fig. 6, Fig. 9, and Fig. 10, and details are omitted here. Note that step S430 may include steps S4301 to S4303 in Fig. 11, and step S431 may include steps S4311 to S4313 in Fig. 7.

[0127] Air-conditioning controller 12 first acquires the external air temperature, the temperature range, and the temperature determination criterion, and determines which temperature range the external air temperature falls within (steps S100 to S300). If the external air temperature falls within the heating range, air-conditioning controller 12 executes steps S410 and S411 to determine the first temporary target temperature. If the external air temperature falls within the cooling range, air-conditioning controller 12 executes steps S420 and S421 to determine the first temporary target temperature. If the external air temperature falls within the intermediate range, air-conditioning controller 12 executes steps S430 to S432 to determine the first temporary target temperature. Note that in step S430, air-conditioning controller 12 may determine the second temporary target temperature in consideration of the shift value.

[0128] After finally determining the first temporary target temperature, air-conditioning controller 12 adds a shift value to the first temporary target temperature (steps S520 and S521), and determines whether or not a result of the addition is included in a predetermined settable range (step S510). Air-conditioning controller 12 determines the first temporary target temperature as the target temperature when the addition result is included in the settable range (step S511), and determines the maximum value or the minimum value in the settable range as the target temperature when the addition result is not included in the settable range (step S512).

[0129] Note that air-conditioning controller 12 may execute step S100 to step S512 at regular time intervals (e.g., every 10 minutes, every 20 minutes, every 30 minutes, every 60 minutes, or every 90 minutes). The comfort of the control space can be maintained by periodically reviewing the target temperature.

<<Third exemplary embodiment>>

<Presentation of target temperature>

[0130] In the third exemplary embodiment, air-conditioning controller 12 can notify terminal 20 of an automatically determined target temperature and cause terminal 20 to present the target temperature to the user. If the target temperature determined by air-conditioning controller 12 is presented via terminal 20, the reliability that the user has for automatic control can be enhanced.

[0131] Terminal 20 is relevant to air conditioner 10 that performs air-conditioning control so that the indoor temperature of the control space approaches the target temperature. As described in the first exemplary embodi-

ment, air conditioner 10 is connected to terminal 20 via air-conditioning communicator 13 and can cooperate with terminal 20. Then, terminal 20 may be terminal 20a, which is an information terminal such as a smart-
phone with built-in dedicated relevant application 25, or terminal 20b, which is a remote controller or the like of air conditioner 10.

[0132] Fig. 13A is a block diagram of an example of terminal 20a in the third exemplary embodiment, and Fig. 13B is a block diagram of an example of terminal 20b in the third exemplary embodiment. Terminal 20a includes terminal storage 21, terminal controller 22, terminal communicator 23, terminal presentation unit 24, and relevant application 25. Terminal 20b includes terminal storage 21, terminal controller 22, terminal communicator 23, and terminal presentation unit 24.

[0133] Terminal communicator 23 of terminal 20a can also transmit and receive Internet packets, and can communicate with air-conditioning communicator 13 of air conditioner 10 and server 30. Terminal communicator 23 may transmit and receive data by performing communication in accordance with standards such as Wi-Fi (registered trademark), IEEE802.2, IEEE802.3, the third generation mobile communication system (3G), LTE, and the fifth generation mobile communication system (5G) between air conditioner 10 and server 30. In addition to the Internet, terminal communicator 23 may perform communication using an intranet, an extra network, LAN, ISDN, VAN, a CATV communication network, a virtual dedicated network, a telephone line network, a mobile communication network, a satellite communication network, infrared rays, and Bluetooth (registered trademark).

[0134] Terminal communicator 23 of terminal 20b basically communicates with air-conditioning communicator 13 via infrared rays, but may communicate with air-conditioning communicator 13 or terminal 20a via Bluetooth (registered trademark) or Wi-Fi (registered trademark). As terminal communicator 23 of terminal 20a, terminal communicator 23 of terminal 20b may also communicate with terminal 20a or server 30 via the Internet by the above-described communication technology.

[0135] Terminal presentation units 24 of terminal 20a and terminal 20b may present information in at least one of numerical values, characters, images, and voices. Terminal presentation unit 24 may include a display for presenting a graphical user interface (GUI). Terminal presentation unit 24 may include a speaker for presenting information such as a target temperature to the user by voice or a voice user interface (VUI) for interacting with the user.

[0136] The performance of terminal presentation unit 24 of terminal 20b is sometimes lower than the performance of terminal presentation unit 24 of terminal 20a. For example, terminal presentation unit 24 of terminal 20b may include a buzzer that emits a simple electronic sound in place of a speaker that utters by voice. Terminal

presentation unit 24 of terminal 20b may include a liquid crystal screen with limited displayable content in place of a display with high resolution.

[0137] Terminal communicator 23 receives, from air conditioner 10, the target temperature automatically determined by air conditioner 10 based on the external air temperature of the control space and the temperature determination criterion relevant to the external air temperature. Terminal controller 22 causes terminal presentation unit 24 to present the target temperature received by terminal communicator 23.

[0138] Hereinafter, features of the notification method executed by air conditioner 10 according to the third exemplary embodiment, the presentation method executed by terminal 20, a program, and a storage medium will be described.

[0139] Fig. 14 is a flowchart of an example of a notification method in the third exemplary embodiment. Air-conditioning controller 12 acquires the external air temperature of the control space (step S100). Then, air-conditioning controller 12 determines the target temperature for the control space based on the external air temperature and the temperature determination criterion relevant to the external air temperature (step S600). Step S600 includes step S200 to step S500 described above, and details are omitted here. Air-conditioning controller 12 notifies terminal 20 relevant to air conditioner 10 of the determined target temperature (step S700).

[0140] In the present disclosure, notifying terminal 20 of the target temperature may include transmitting the target temperature to terminal 20, and may include transmitting the target temperature to terminal 20 and causing terminal 20 to present the target temperature. That is, air-conditioning controller 12 may cause terminal 20 to present at least one of numerical values, characters, images, and voices representing the determined target temperature.

[0141] Air-conditioning controller 12 may further notify terminal 20 of at least one of the external air temperature, the indoor temperature, the operation mode of air conditioner 10, and the temperature difference between the target temperature and the indoor temperature. Air-conditioning controller 12 may, at regular time intervals, calculate the temperature difference between the target temperature and the indoor temperature and notify terminal 20 of the temperature difference.

[0142] When updating the target temperature or the shift value, air-conditioning controller 12 can notify terminal 20 of the updated target temperature or shift value as needed and cause terminal 20 to present the updated target temperature or shift value.

[0143] Since the target temperature automatically determined by air conditioner 10 is presented to the user, understanding and reliability to the automatic control are enhanced. When presented with the external air temperature, the indoor temperature, the operation mode, or the temperature difference between the target temperature and the indoor temperature, the user can more

accurately understand the situation of the air-conditioning control for the control space.

[0144] Fig. 15A is a presentation example of the target temperature by terminal 20a as a smartphone of the user in the third exemplary embodiment. Terminal 20a can execute relevant application 25 and control air conditioner 10 via relevant application 25. Screen SC1 in Fig. 15A is a screen presented by terminal presentation unit 24 and relevant application 25. This is a screen in a case where the current month is December, the outdoor temperature is 12°C, the indoor temperature is 16.5°C, the operation mode determined by air-conditioning controller 12 is the heating mode, and the target temperature determined by air-conditioning controller 12 is 22°C. Air-conditioning controller 12 transmits information including the target temperature to terminal 20a to present the information as in screen SC1. Screen SC1 also presents, with an icon "AI", that it is currently in automatic operation and that the indoor humidity is 50%.

[0145] Fig. 15B is a presentation example of the target temperature by terminal 20a as a smartphone of the user in the third exemplary embodiment. Screen SC2 in Fig. 15B presents the target temperature as an image including a flag in place of a numerical value. By arranging both images representing the indoor temperature and the target temperature on a temperature axis, the user can intuitively understand the temperature difference between the target temperature and the indoor temperature. Terminal presentation unit 24 may present the target temperature by voice in place of presenting a numerical value or an image, or in addition to presenting a numerical value or an image.

[0146] Fig. 15C is a presentation example of the target temperature by terminal 20b as a remote controller in the third exemplary embodiment. Screen SC3 in Fig. 15C presents, with characters of "AI comfort automatic", that it is currently in automatic operation and that the target temperature is 22°C.

[0147] Other than the target temperature and environmental information regarding the control space, air-conditioning controller 12 may cause terminal 20 to present a user interface for receiving a user feedback on the target temperature.

[0148] For example, region R1 of screen SC1 of Fig. 15A and region R3 of screen SC2 of Fig. 15B each present a GUI for receiving a user feedback. For example, the user can give feedback in increments of 0.5°C through the GUI. For example, when the sign "-" on the left side of the GUI is pressed, terminal 20a transmits feedback of "-0.5°C" to air-conditioning controller 12. Upon acquiring the feedback from terminal 20a, air-conditioning controller 12 subtracts 0.5°C from the feedback shift. Conversely, when the sign "+" on the right side of the GUI is pressed, terminal 20a transmits feedback of "+0.5°C" to air-conditioning controller 12. Upon acquiring the feedback from terminal 20a, air-conditioning controller 12 adds 0.5°C to the feedback shift. The value of the current feedback shift is presented in region R2 of screen

SC1 of Fig. 15A and region R4 of screen SC2 of Fig. 15B.

[0149] When terminal 20 is a remote controller, a substantive button can be provided as a user interface. For example, the lower half of terminal 20b illustrated in Fig. 15C is provided with a plurality of substantive buttons, and among them, there is a temperature button. The user can input feedback to terminal 20b by operating this temperature button. For example, when the upper part of the temperature button is pressed once, terminal 20a transmits feedback of "+0.5°C" to air-conditioning controller 12. The value of the current feedback shift is presented in region R5 in terminal presentation unit 24 of Fig. 15C.

[0150] As described above, air conditioner 10 can notify terminal 20 of the automatically determined target temperature and causes terminal 20 to present the same in cooperation with terminal 20. In other words, by executing the presentation method of the present disclosure, terminal 20 can present the user with the target temperature determined by air conditioner 10.

[0151] Fig. 16 is a flowchart of an example of the presentation method in the third exemplary embodiment. Terminal controller 22 receives, from air conditioner 10, the target temperature automatically determined by air conditioner 10 based on the external air temperature of the control space of air conditioner 10 and the temperature determination criterion relevant to the external air temperature (step S800). Then, as in Figs. 15A to 15C, terminal controller 22 causes terminal presentation unit 24 to present the received target temperature (step S900).

[0152] As described above, terminal 20 may further present the user with information such as the indoor temperature, and may transmit feedback input by the user to air conditioner 10.

[0153] Air-conditioning controller 12 has a program to be used to execute the above-described notification method. The program causes air-conditioning controller 12 of air conditioner 10 to execute the notification method.

[0154] Terminal controller 22 has a program to be used to execute the above-described presentation method. The program causes terminal controller 22 of terminal 20 to execute the presentation method.

[0155] Air conditioner 10 includes a non-transitory computer-readable storage medium storing a computer program including a program used to execute the notification method described above. When the computer program is executed by the processor (air-conditioning controller 12), the notification method of the present disclosure is implemented. The storage medium may be the same as air-conditioning storage 11 of air conditioner 10, may be included in air-conditioning storage 11, or may be a component different from air-conditioning storage 11.

[0156] Terminal 20 includes a non-transitory computer-readable storage medium storing a computer program including a program used to execute the presenta-

tion method described above. When the computer program is executed by the processor (terminal controller 22), the presentation method of the present disclosure is implemented. The storage medium may be the same as terminal storage 21 of terminal 20, may be included in terminal storage 21, or may be a component different from terminal storage 21.

[0157] The above is merely specific exemplary embodiments of the present disclosure, and the protection scope of the present disclosure is not limited to this. The present disclosure includes the content described above in the drawings and the specific exemplary embodiments described above, but the present disclosure is not limited to the content. Various disclosed exemplary embodiments or examples can be combined without departing from the scope or spirit of the present disclosure. Changes not departing from functional and structural principles of the present disclosure are within the scope of the claims.

Claims

1. An air conditioner that determines target temperature appropriate for a control space to be subjected to air-conditioning control, the air conditioner comprising:

an air-conditioning storage that stores a temperature range including a heating range, an intermediate range, and a cooling range, and further stores a temperature determination criterion including a heating determination criterion and a cooling determination criterion, the air-conditioning storage in which the heating determination criterion defines a first relationship between an external air temperature falling within the heating range and the intermediate range and a first temporary target temperature, and the cooling determination criterion defines a second relationship between an external air temperature falling within the cooling range and the intermediate range and the first temporary target temperature; and

an air-conditioning controller that

acquires an external air temperature of the control space,
acquires the temperature range and the temperature determination criterion, determines as to which of the heating range, the intermediate range, and the cooling range of the temperature range the external air temperature falls within,
determines the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined tem-

perature range, and
determines the target temperature based on the first temporary target temperature.

2. The air conditioner according to Claim 1, wherein the temperature determination criterion is generated based on a feedback history of a situation where a user feels comfortable in the control space.

3. The air conditioner according to Claim 1, wherein when the determined temperature range is the cooling range, the air-conditioning controller

determines a cooling mode as an operation mode, and
determines the first temporary target temperature based on the external air temperature and the cooling determination criterion.

4. The air conditioner according to Claim 1, wherein when the determined temperature range is the intermediate range, the air-conditioning controller

determines a second temporary target temperature based on the external air temperature, the heating determination criterion, and the cooling determination criterion,
determines a heating mode or a cooling mode as an operation mode based on the external air temperature and the second temporary target temperature, and
determines the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined operation mode.

5. The air conditioner according to Claim 1, wherein when determining the target temperature based on the first temporary target temperature, the air-conditioning controller

acquires a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space, and
determines a sum of the first temporary target temperature and the shift value as the target temperature.

6. The air conditioner according to Claim 5, wherein

the shift value includes a month information shift,
the air-conditioning storage further stores a first collation table of the month information and the month information shift, and

the air-conditioning controller

acquires the month information, and
acquires the month information shift by col-
lating the month information with the first
collation table. 5

7. The air conditioner according to Claim 5, wherein

the shift value includes a feedback shift, 10
the feedback shift is input by a user regarding
comfort of the control space via a terminal re-
levant to the air conditioner, and
the air-conditioning controller acquires the feed-
back shift from the terminal. 15

8. The air conditioner according to Claim 5, wherein

the shift value includes a solar irradiance
amount shift, 20
the air conditioner further includes a solar irra-
diance sensor that detects a solar irradiance
amount received by the control space,
the air-conditioning storage further stores a sec-
ond collation table of the solar irradiance amount 25
and the solar irradiance amount shift, and
the air-conditioning controller

acquires the solar irradiance amount by the
solar irradiance sensor, and 30
acquires the solar irradiance amount shift
by collating the solar irradiance amount with
the second collation table.

9. The air conditioner according to Claim 5, wherein 35

the shift value includes an activity amount shift,
the air conditioner further includes an activity
amount sensor that detects a user activity
amount in the control space, 40
the air-conditioning storage further stores a third
collation table of the activity amount and the
activity amount shift, and
the air-conditioning controller 45

acquires the activity amount by the activity
amount sensor, and
acquires the activity amount shift by collat-
ing the activity amount with the third col-
lation table. 50

10. The air conditioner according to Claim 1, wherein

when determining the target temperature based
on the first temporary target temperature, the 55
air-conditioning controller
determines whether or not the first temporary
target temperature falls within a predetermined

settable range,

determines the first temporary target tempera-
ture as the target temperature when the first
temporary target temperature falls within the
predetermined settable range, and
determines a maximum value or a minimum
value of the predetermined settable range as
the target temperature when the first temporary
target temperature is not included in the prede-
termined settable range.

11. A target temperature determination method for de-
termining an appropriate target temperature for a
control space to be subjected to air-conditioning
control, the target temperature determination meth-
od comprising:

acquiring an external air temperature of the
control space;
acquiring a temperature range including a heat-
ing range, an intermediate range, and a cooling
range, and acquiring a temperature determina-
tion criterion including a heating determination
criterion and a cooling determination criterion, in
which the heating determination criterion de-
fines a first relationship between an external
air temperature falling within the heating range
and the intermediate range, and a first tempo-
rary target temperature, and the cooling determi-
nation criterion defines a second relationship
between an external air temperature falling with-
in the cooling range and the intermediate range,
and the first temporary target temperature;
determining as to which of the heating range, the
intermediate range, and the cooling range of the
temperature range the external air temperature
falls within;
determining the first temporary target tempera-
ture based on the external air temperature and
the temperature determination criterion corre-
sponding to a determined temperature range;
and
determining the target temperature based on
the first temporary target temperature.

12. The target temperature determination method ac-
cording to Claim 11, wherein
determining the first temporary target temperature
includes

determining a second temporary target tem-
perature based on the external air temperature,
the heating determination criterion, and the
cooling determination criterion,
determining a heating mode or a cooling mode
as an operation mode based on the external air
temperature and the second temporary target
temperature, and

determining the first temporary target temperature based on the external air temperature and the temperature determination criterion corresponding to a determined operation mode.

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13. The target temperature determination method according to Claim 11, wherein determining the target temperature includes

acquiring a shift value relevant to at least one of month information regarding a current calendar month, a user feedback, a solar irradiance amount being received by the control space, and a user activity amount in the control space, and
determining a sum of the first temporary target temperature and the shift value as the target temperature.

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14. A program for causing an air conditioner to execute the target temperature determination method according to any one of Claims 11 to 13.

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15. A non-transitory computer-readable storage medium storing a computer program including the program according to Claim 14, wherein when the computer program is executed by a processor, the target temperature determination method according to any one of Claims 11 to 13 is implemented

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FIG. 1A

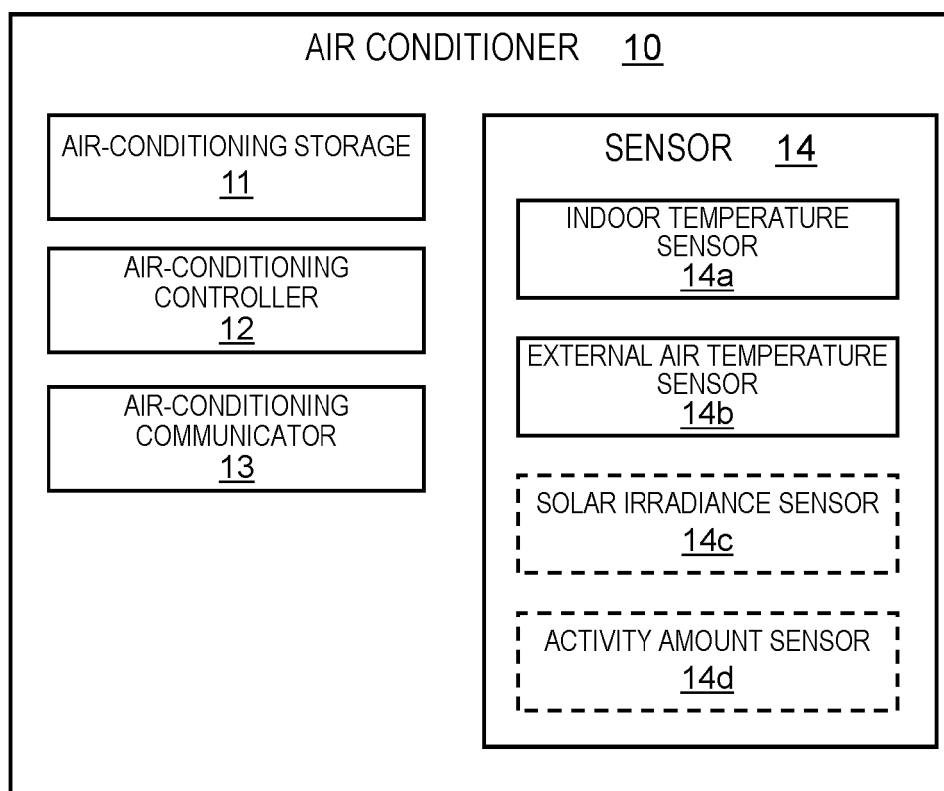


FIG. 1B

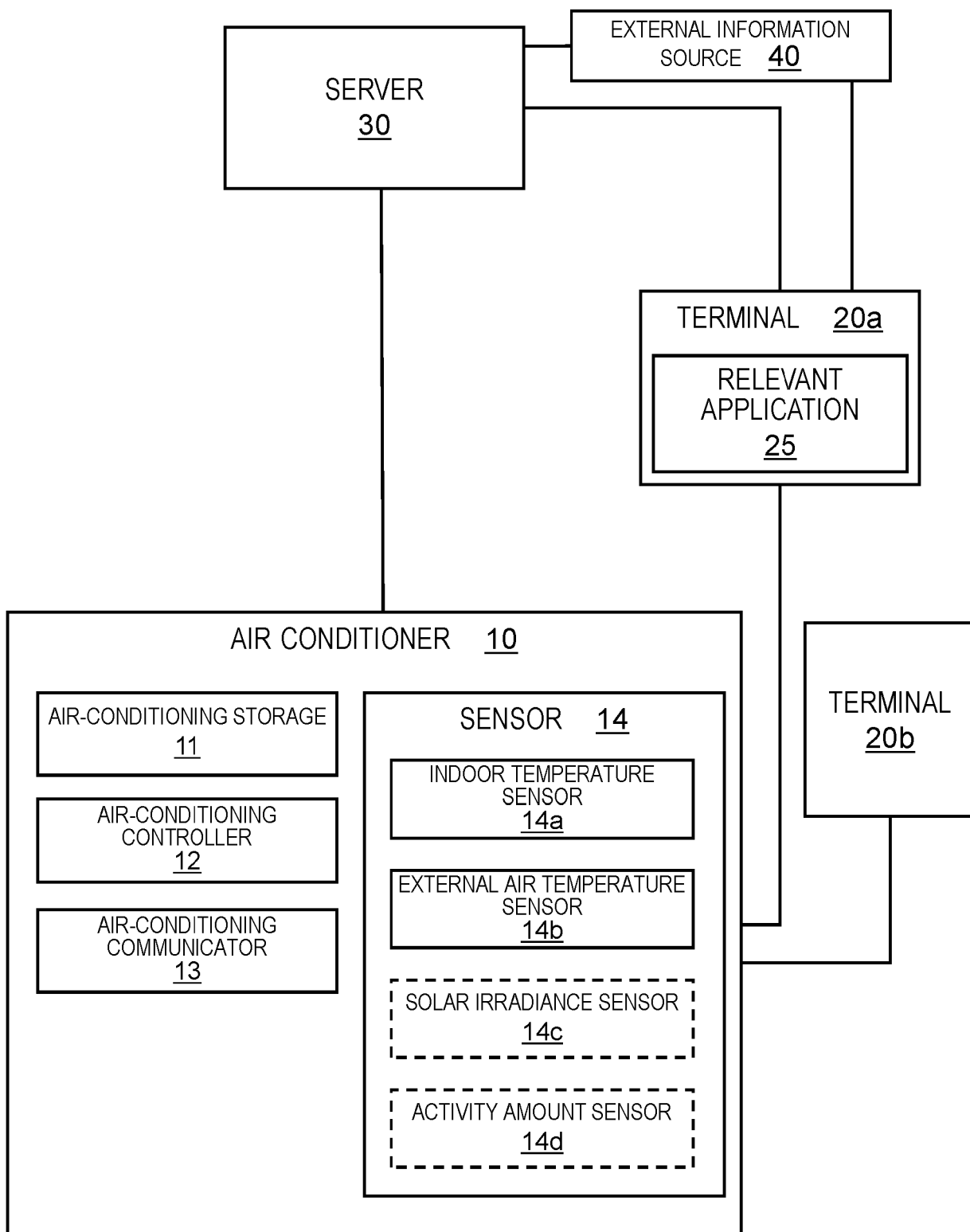


FIG. 2

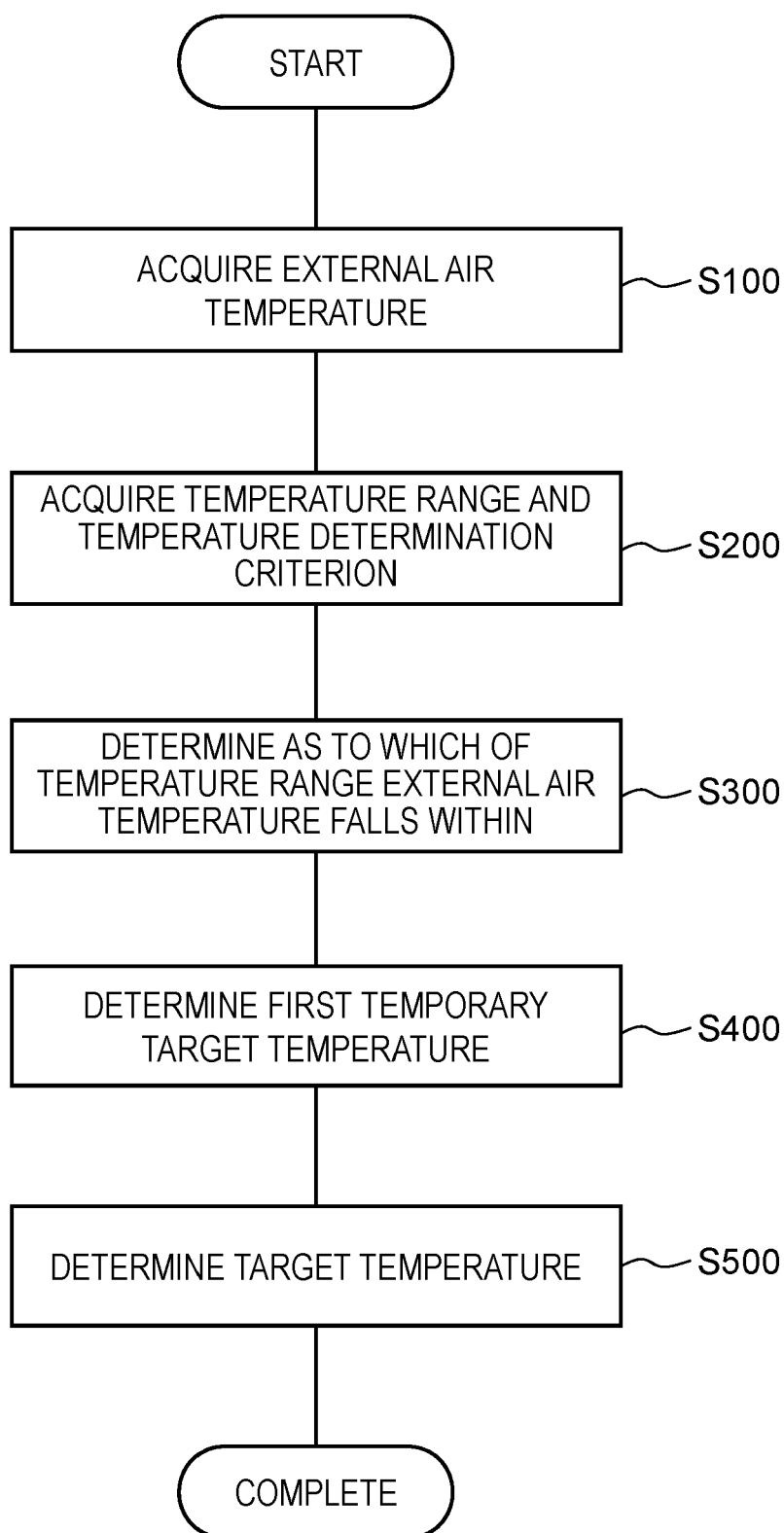


FIG. 3

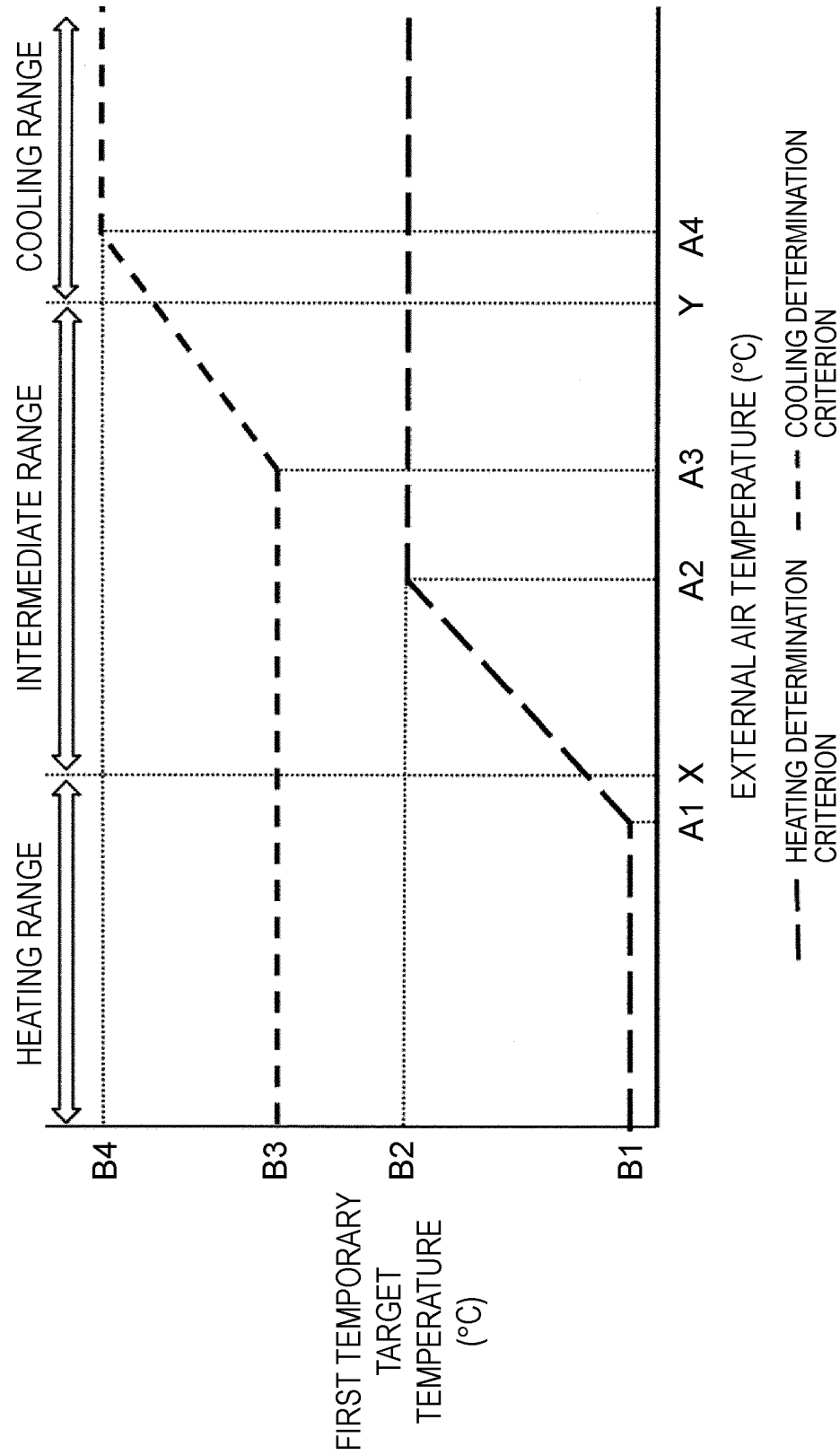


FIG. 4

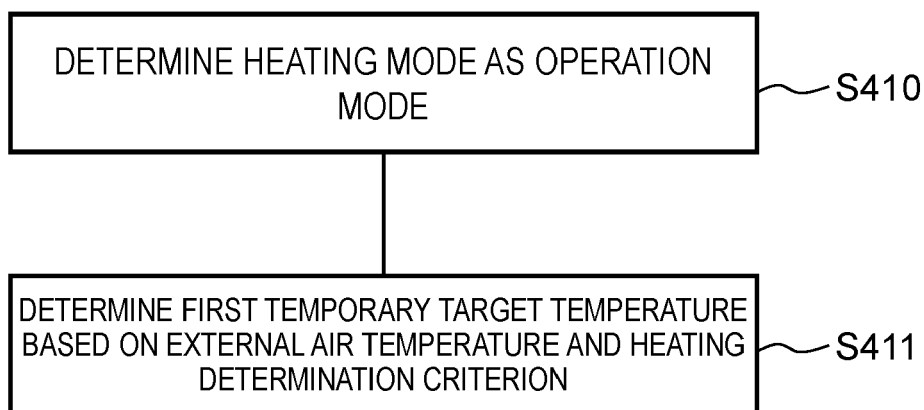


FIG. 5

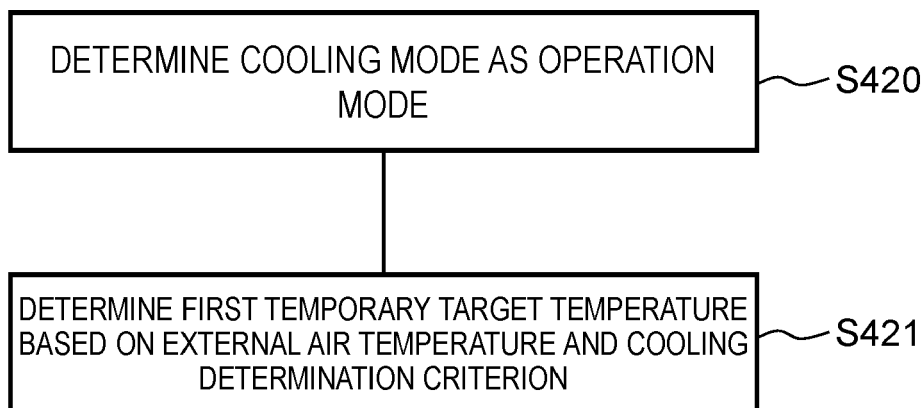


FIG. 6

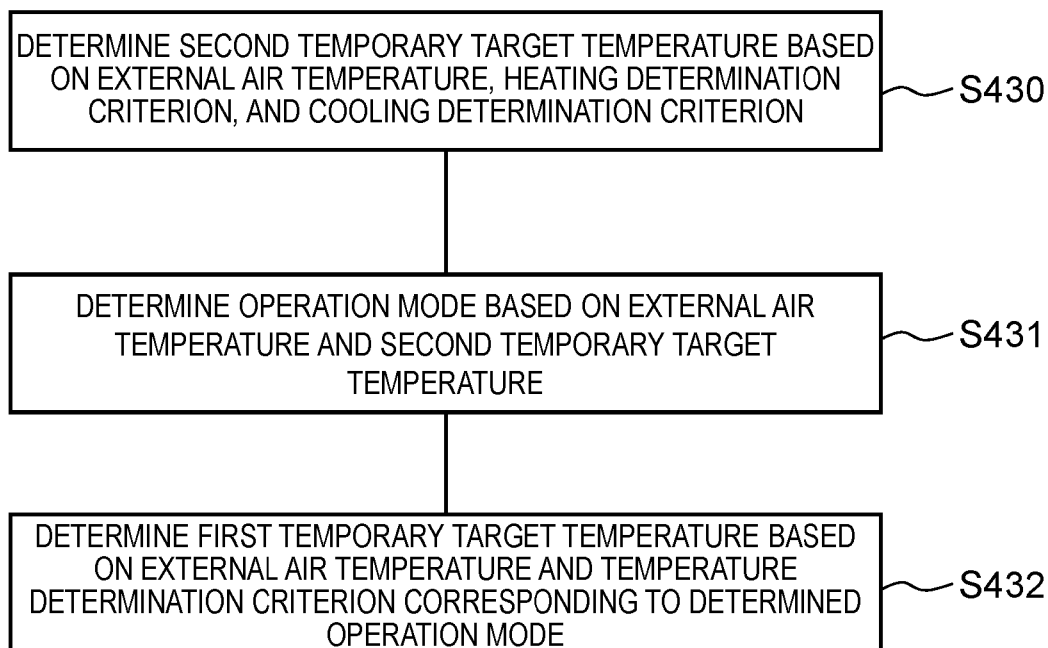


FIG. 7

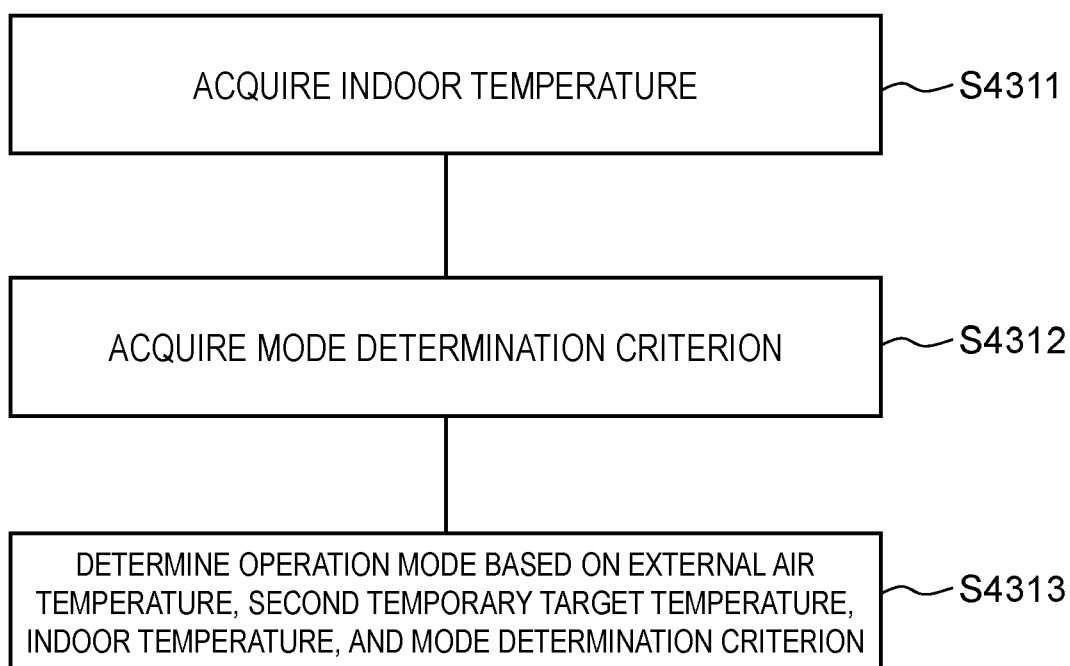


FIG. 8A

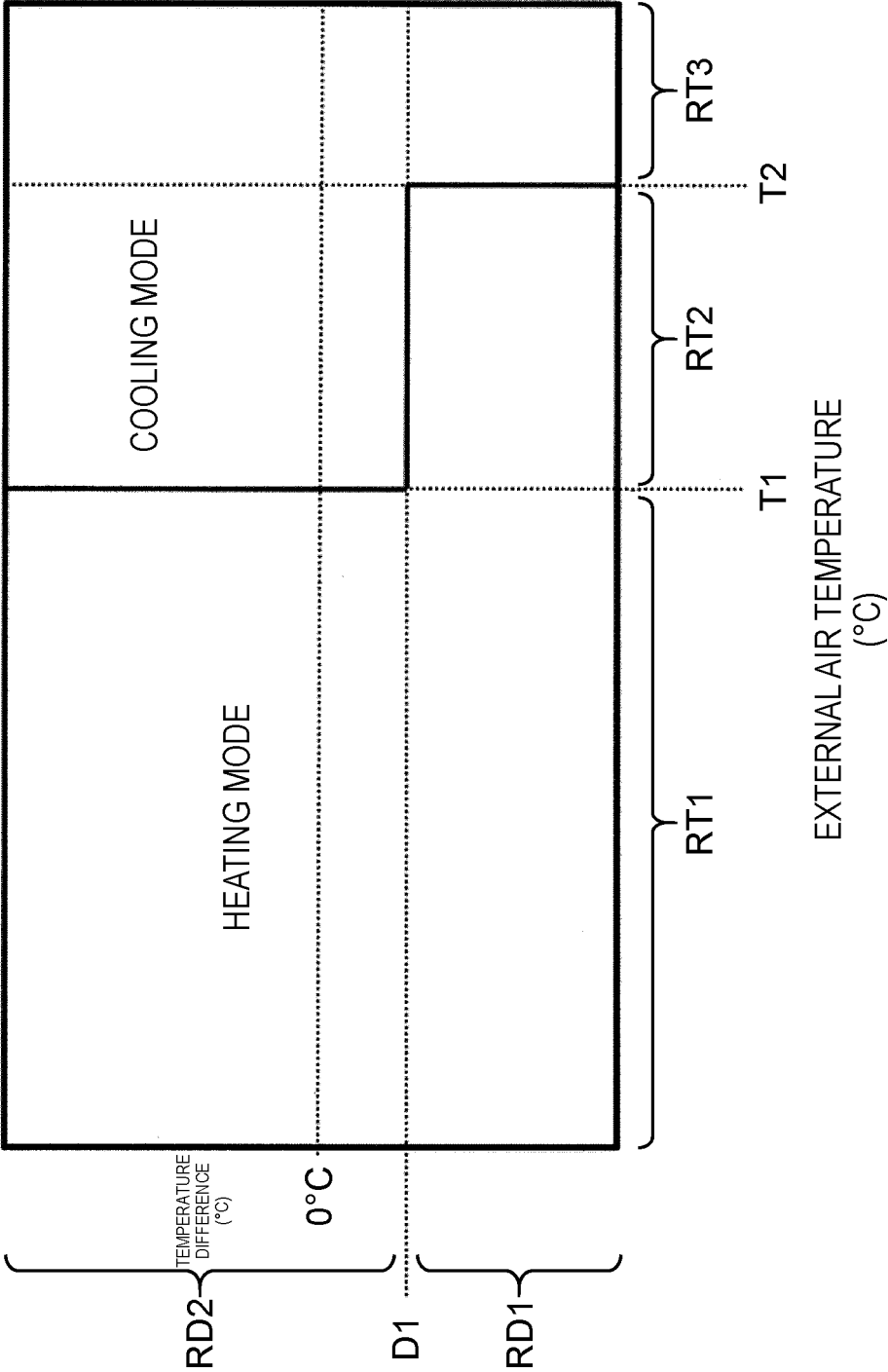


FIG. 8B

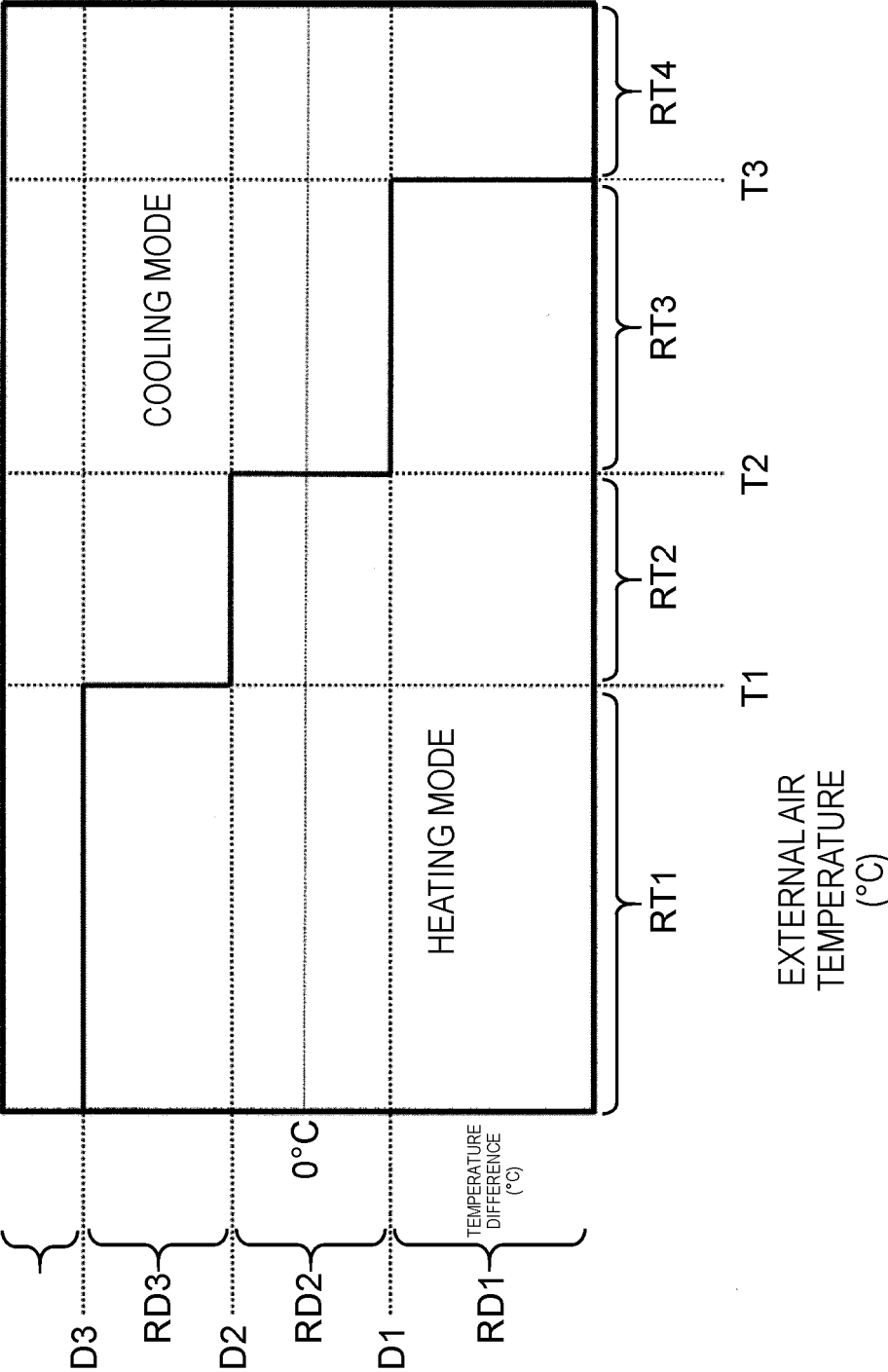


FIG. 9

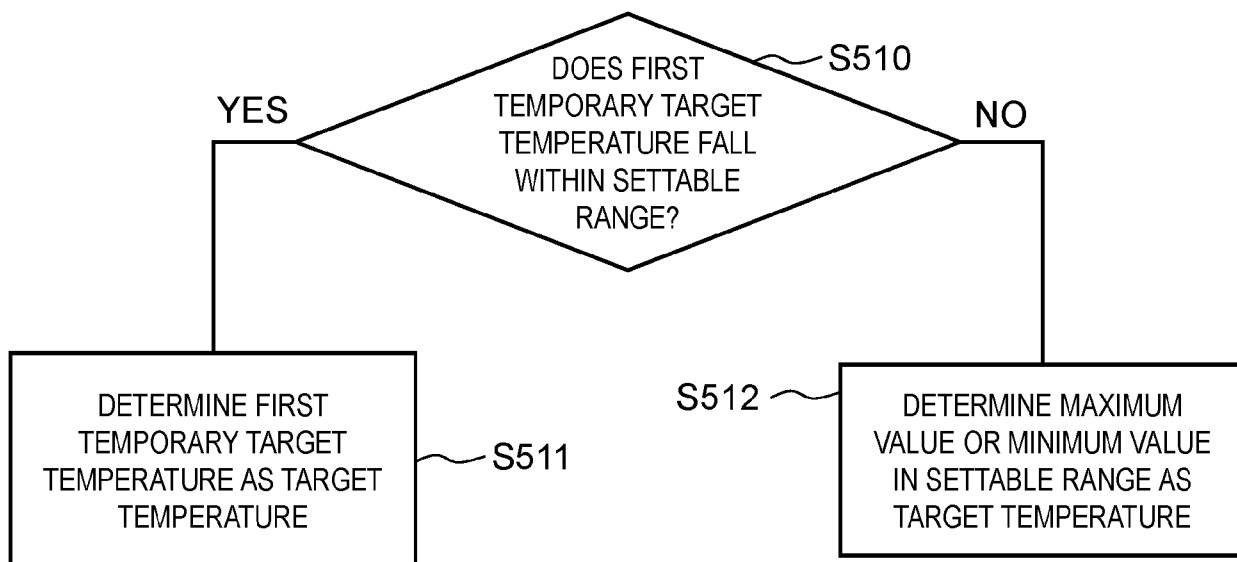


FIG. 10

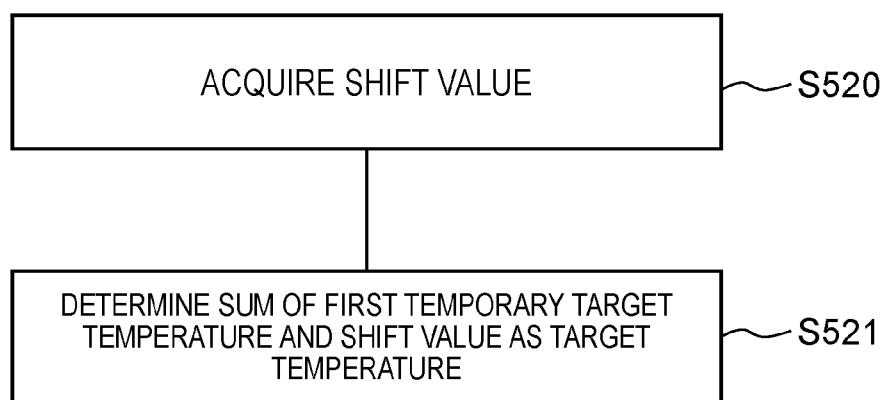


FIG. 11

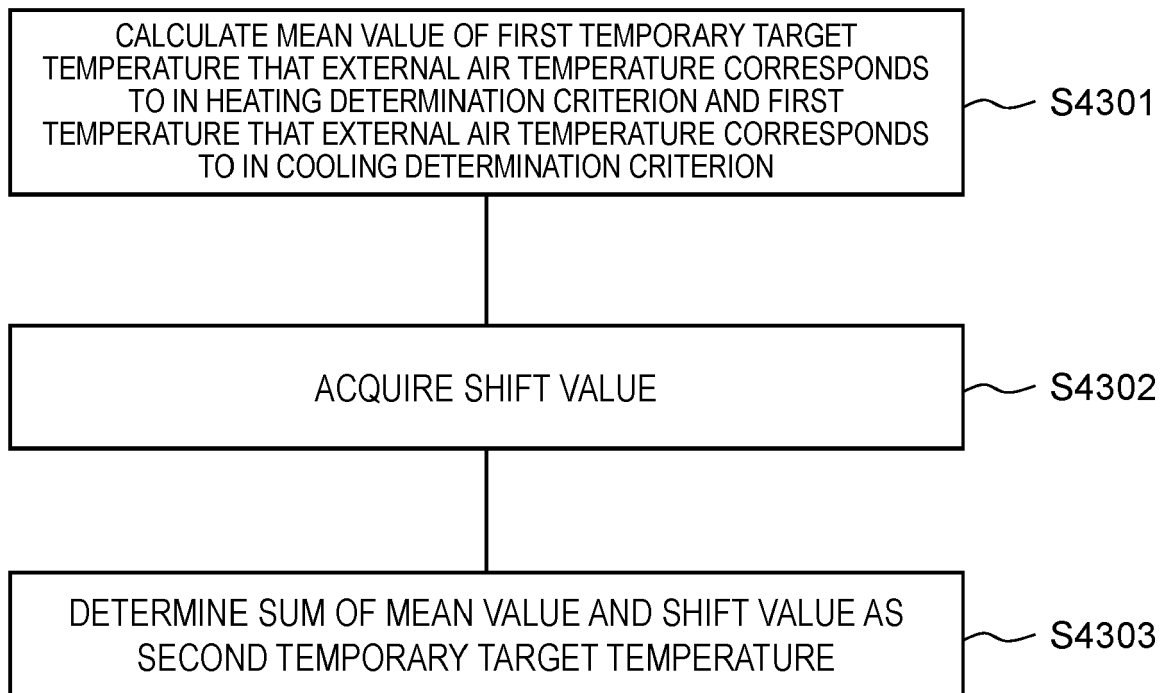


FIG. 12

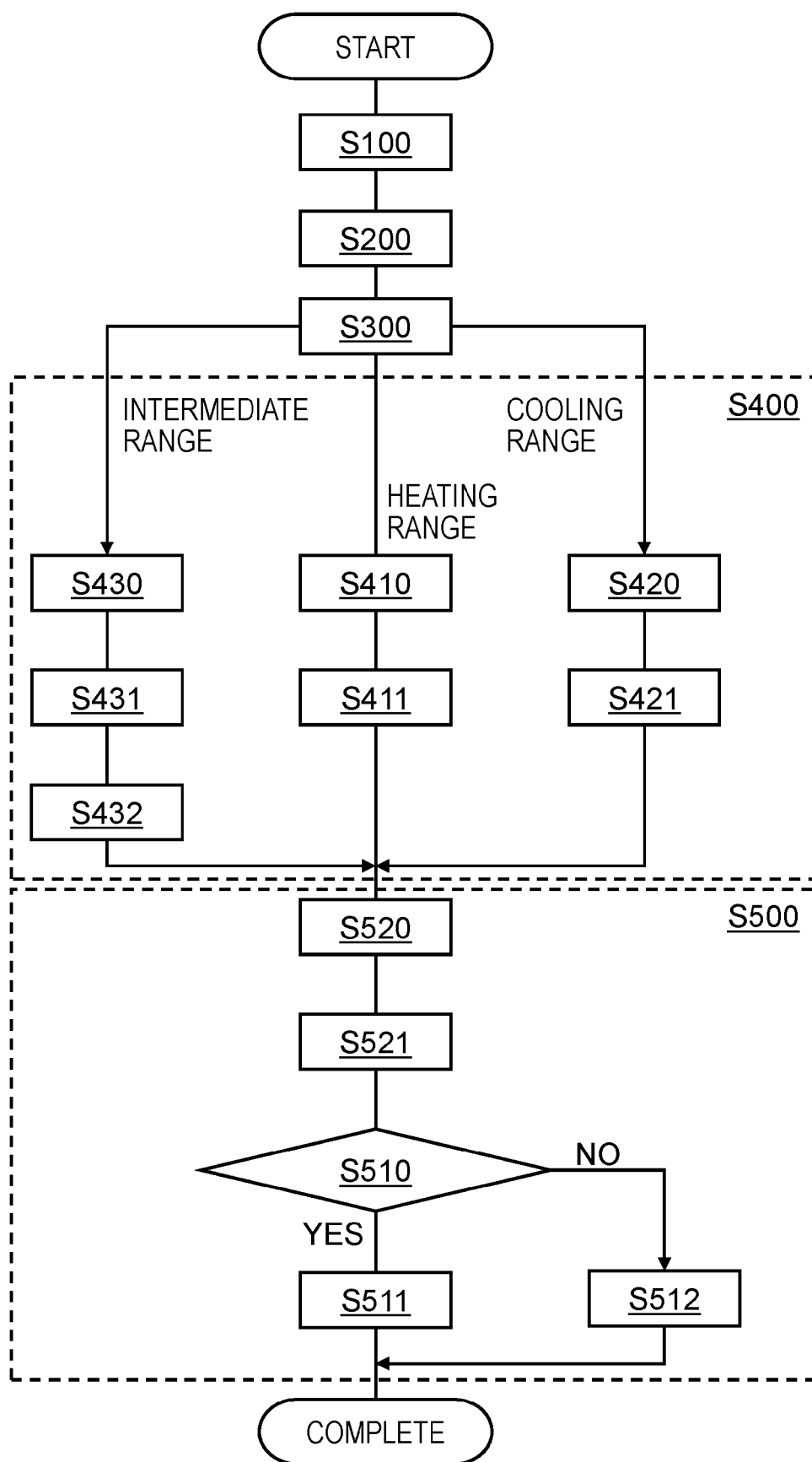


FIG. 13A

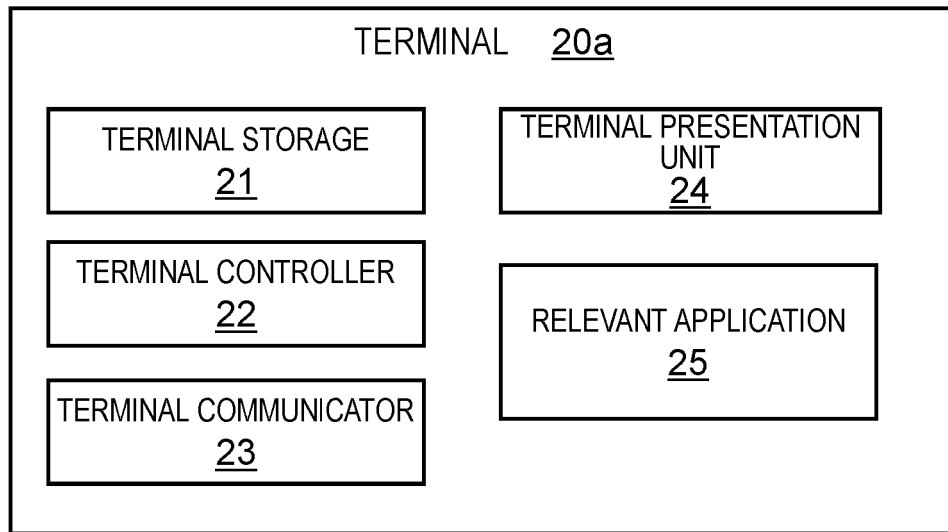


FIG. 13B

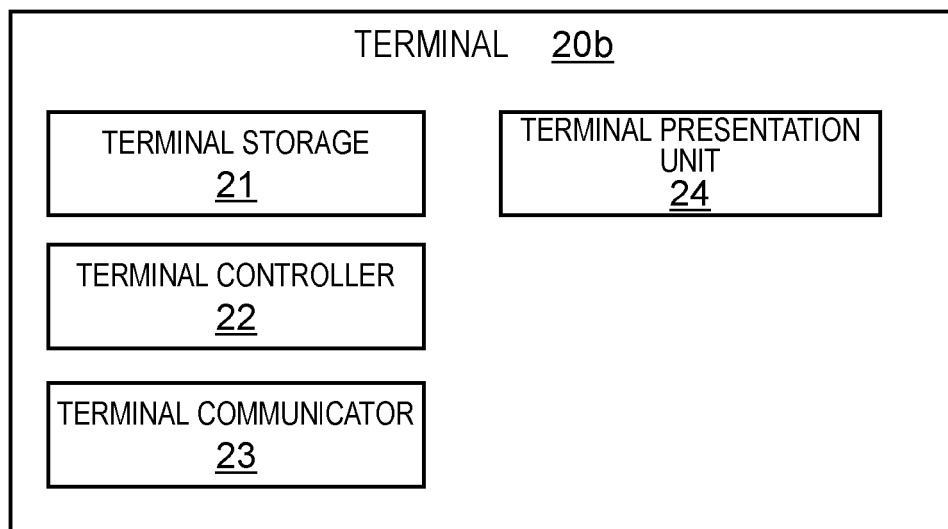


FIG. 14

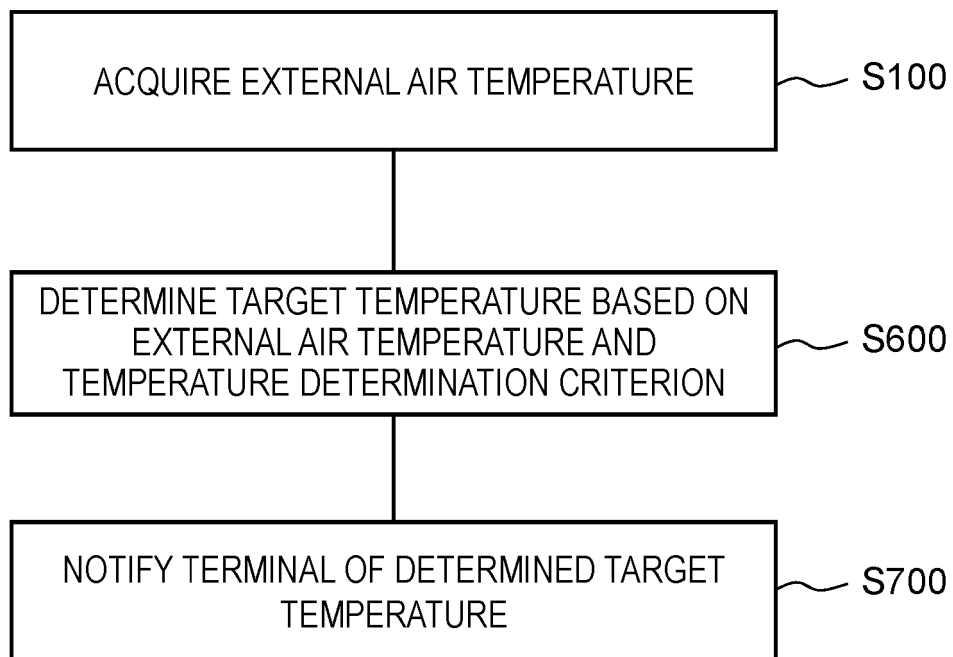


FIG. 15A

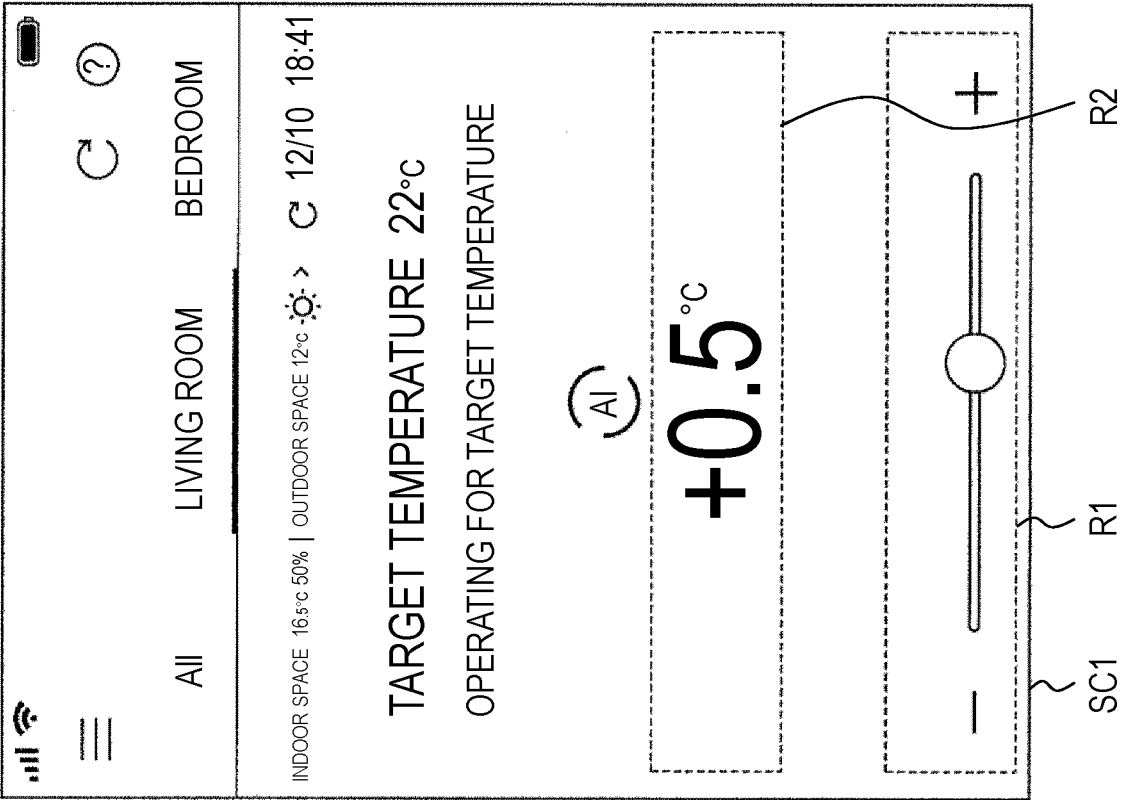


FIG. 15B

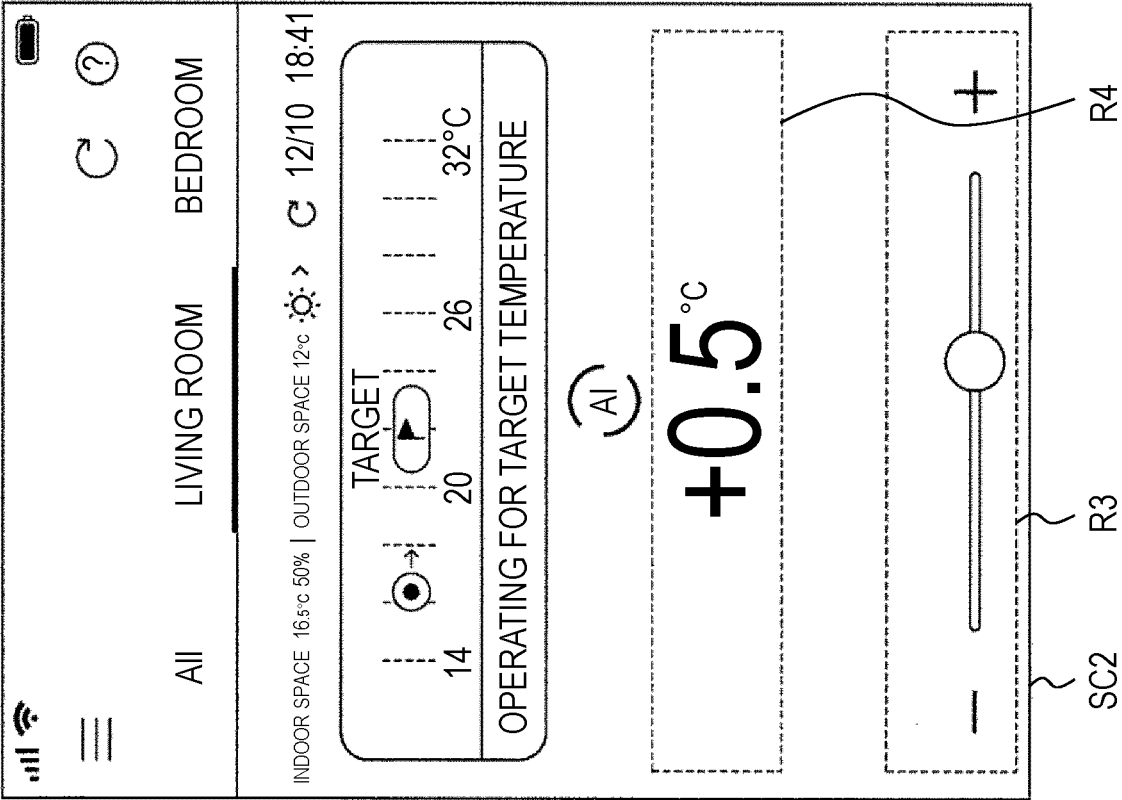


FIG. 15C

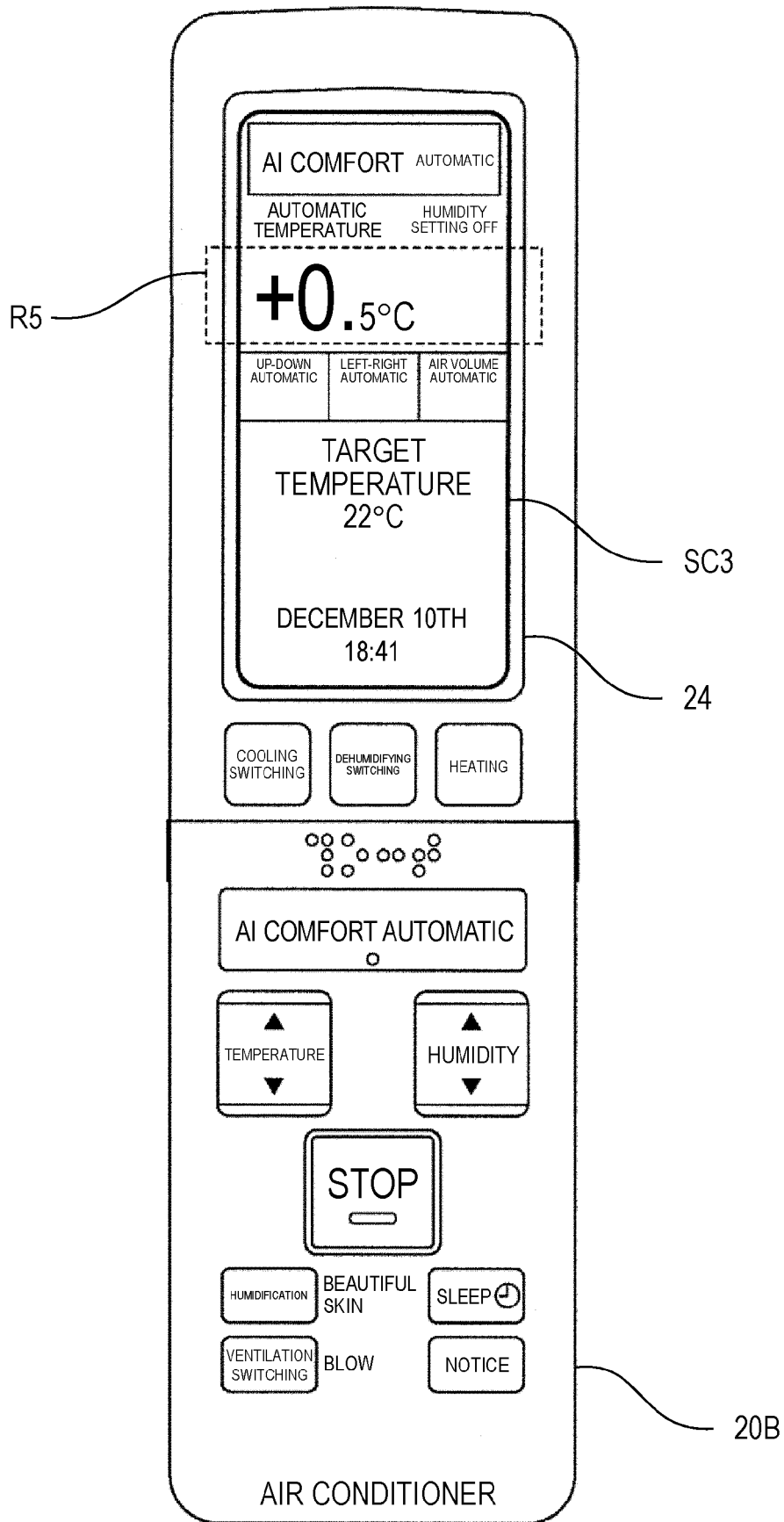
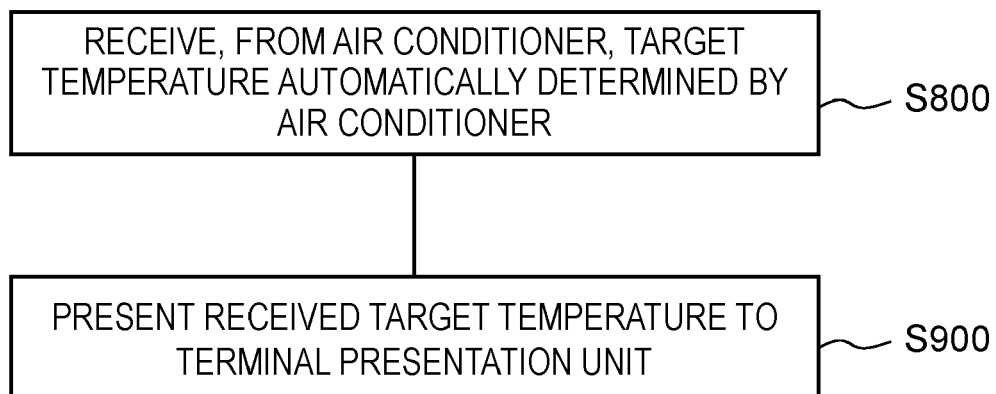


FIG. 16





EUROPEAN SEARCH REPORT

Application Number

EP 24 20 4150

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			TECHNICAL FIELDS SEARCHED (IPC)
			F24F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		28 January 2025	Decking, Oliver
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