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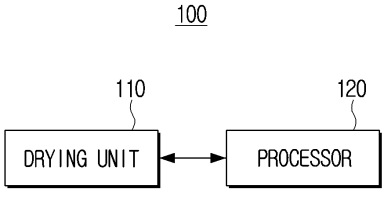
(54) **DRYING DEVICE AND CONTROL METHOD THEREFOR**

(57) Disclosed is a drying device comprising a drying unit and a processor for controlling the operation of the drying unit. The processor can control the drying unit so as to: identify, if a drying request is received, whether the drying request is an initial drying request for an object to be dried or an additional drying request for the object to be dried; and, if the drying request is identified as an additional drying request, perform an additional drying operation for the object to be dried on the basis of a drying operation method corresponding to a previous drying request for the object to be dried.

FIG. 1



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Description

[Technical Field]

[0001] The disclosure relates to a drying apparatus and a method for controlling the same, and more particularly, relates to a drying apparatus for drying a material to be dried and a method for controlling the same.

[Background Art]

[0002] In recent years, with distribution of drying apparatuses, drying apparatuses providing various functions are being developed. For example, a drying apparatus provides various courses such as standard drying, rapid drying, shirt drying, time drying, AI-customized drying, delicate clothes drying, wool drying, bed sheets drying, towel drying, wind drying, and the like. In addition, the drying apparatus may provide a current operation state of the drying apparatus or request for maintenance to a user after inspecting the state of the drying apparatus.

[0003] Although the drying apparatus provides various functions as described above, if a user selects a wrong course or dries a material to be dried such as the bed sheets, the drying to the extent desired by the user may not be performed.

[0004] In this case, the user performs the drying again, but the drying apparatus performs the same drying operation without reflecting the previous drying history, which leads to a problem that the material to be dried is damaged due to excessive drying.

[0005] The user may change the drying setting directly, but the user may not objectively determine a humidity state of the material to be dried that is dried primarily and it is difficult to set the drying operation not to damage the material to be dried.

[0006] Therefore, it is necessary to develop a method for performing an optimal drying operation without user's inconvenience when performing an additional drying operation.

[Technical Solution]

[0007] According to an embodiment of the disclosure to achieve the aforementioned object, there is provided a drying apparatus including a drying unit, and a processor configured to control an operation of the drying unit, in which the processor is configured to, based on a drying request being received, identify whether the drying request is an initial drying request for a material to be dried or an additional drying request for the material to be dried, and based on the drying request being identified as the additional drying request, control the drying unit to perform an additional drying operation for the material to be dried based on a drying operation method corresponding to a previous drying request for the material to be dried.

[0008] The material to be dried is a first material to be dried and the drying apparatus is further comprises: a memory to store weight information on a second material to be dried that is dried immediately before the drying request is received and humidity information associated with the second material to be dried, wherein the processor is configured to: identify at least one of weight information or humidity information associated with the first material to be dried; and identify whether the drying request is the initial drying request or the additional drying request based on the identified information and the information stored in the memory.

[0009] The memory further stores opening and closing information of a door of the drying apparatus after a drying operation immediately before the drying request is received, and wherein the processor is configured to identify whether the drying request is the initial drying request or the additional drying request by further considering the opening and closing information of the door.

[0010] The processor is configured to: based on the drying request being the additional drying request and a drying level of the drying operation method being at a threshold level or higher, control the drying unit to perform the additional drying operation based on the drying operation method; wherein the drying level represents one of a plurality of drying times for each drying course, and wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

[0011] The processor is configured to: based on the drying request being the additional drying request, control the drying unit to perform the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method.

[0012] The processor is configured to: based on the drying operation method being a predetermined first drying course among a plurality of drying courses, change at least one of the drying time or the drying end determination condition and the drying temperature; and based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, change at least one of the drying time or the drying end determination condition.

[0013] The processor is configured to: based on the drying request being the additional drying request and a drying level of the drying operation method being less than at a threshold level, provide a message for rechecking the drying level to a user; and based on the drying level being input from the user, control the drying unit to perform the additional drying operation based on the drying operation method and the input drying level, wherein the drying level represents one of a plurality of drying times for each drying course, and wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

[0014] The processor is configured to, based on the drying request being the additional drying request and the drying level of the drying operation method being less

than at the threshold level, control the drying unit to perform the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying end determination condition, or a drying time corresponding to the input drying level of the drying operation method.

[0015] The processor is configured to: based on the drying operation method being a predetermined first drying course among a plurality of drying courses, change at least one of the drying end determination condition or the drying time corresponding to the input drying level and the drying temperature; and based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, change at least one of the drying end determination condition or the drying time corresponding to the input drying level.

[0016] The processor is configured to: based on the drying request being the additional drying request, identify the number of times that the additional drying request is input; and based on the number of times that the additional drying request is input being two or more times, control the drying unit to perform the additional drying operation for the first material to be dried based on a drying operation method corresponding to the initial drying request and a drying operation method corresponding to at least one additional drying request before the drying request.

[0017] According to another embodiment of the disclosure, there is provided a method for controlling a drying apparatus, the method including receiving a drying request, identifying whether the drying request is an initial drying request for a first material to be dried or an additional drying request for the first material to be dried, and based on the drying request being identified as the additional drying request, performing an additional drying operation for the first material to be dried based on a drying operation method corresponding to a previous drying request for the first material to be dried.

[0018] The method is further comprising: storing weight information associated with a second material to be dried that is dried immediately before the drying request is received, and humidity information associated with the second material to be dried, wherein the identifying comprises: identifying at least one of weight information or humidity information associated with the first material to be dried; and identifying whether the drying request is the initial drying request or the additional drying request based on the identified information and the stored information.

[0019] The storing comprises storing opening and closing information of a door of the drying apparatus after a drying operation immediately before the drying request is received, and wherein the identifying comprises identifying whether the drying request is the initial drying request or the additional drying request by further considering the opening and closing information of the door.

[0020] The performing the additional drying operation comprises, based on the drying request being the additional drying request and a drying level of the drying operation method being at a threshold level or higher, performing the additional drying operation based on the drying operation method, wherein the drying level represents one of a plurality of drying times for each drying course, and wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

[0021] The performing the additional drying operation comprises, based on the drying request being the additional drying request, performing the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method.

[0022] According to various embodiments described above, the drying apparatus may perform the additional drying operation based on the previous drying operation method, when the additional drying request is input, thereby enabling efficient drying while preventing the damage on the material to be dried.

[0023] In addition, as the drying apparatus identifies whether the drying request of the user is the additional drying command, a user's convenience is enhanced.

[Brief Description of Drawings]

[0024]

FIG. 1 is a block diagram illustrating a configuration of a drying apparatus according to an embodiment.

FIG. 2 is a block diagram illustrating a specific configuration of the drying apparatus according to an embodiment.

FIG. 3 is a flowchart illustrating an additional drying operation according to an embodiment.

FIG. 4 is a diagram illustrating drying courses and drying levels according to an embodiment.

FIGS. 5 and 6 are diagrams illustrating an additional drying command according to various embodiments.

FIG. 7 is a diagram illustrating an artificial intelligence model which identifies a type of a drying command according to an embodiment.

FIG. 8 is a diagram illustrating an artificial intelligence model which identifies a drying option according to an embodiment.

FIG. 9 is a flowchart illustrating a method for controlling a drying apparatus according to an embodiment.

[Detailed Description]

[0025] Hereinafter, the disclosure will be described in detail with reference to the accompanying drawings.

[0026] The terms used in embodiments of the disclosure have been selected as widely used general terms as possible in consideration of functions in the disclosure, but these may vary in accordance with the intention of

those skilled in the art, the precedent, the emergence of new technologies and the like. In addition, in a certain case, there may also be an arbitrarily selected term, in which case the meaning will be described in the description of the disclosure. Therefore, the terms used in the disclosure should be defined based on the meanings of the terms themselves and the contents throughout the disclosure, rather than the simple names of the terms.

[0027] In this disclosure, the terms such as "comprise", "may comprise", "consist of', or "may consist of' are used herein to designate a presence of corresponding features (e.g., constituent elements such as number, function, operation, or part), and not to preclude a presence of additional features.

[0028] In this disclosure, expressions such as "A or B", "at least one of A [and/or] B,", or "one or more of A [and/or] B," include all possible combinations of the listed items.

[0029] The expressions "first," "second" and the like used in the disclosure may denote various elements, regardless of order and/or importance, and may be used to distinguish one element from another, and does not limit the elements.

[0030] Unless otherwise defined specifically, a singular expression may encompass a plural expression. It is to be understood that the terms such as "comprise" or "consist of' are used herein to designate a presence of characteristic, number, step, operation, element, part, or a combination thereof, and not to preclude a presence or a possibility of adding one or more of other characteristics, numbers, steps, operations, elements, parts or a combination thereof.

[0031] In this disclosure, a term "user" may refer to a person using a drying apparatus or an apparatus using a drying apparatus (e.g., an artificial intelligence apparatus).

[0032] The disclosure is made in view of the above needs and an object of the disclosure is to provide a drying apparatus which performs an additional drying operation efficiently according to an additional drying request (command) and a method for controlling the same.

[0033] An embodiment of the disclosure will be described in more detail with reference to the accompanying drawings hereinafter.

[0034] FIG. 1 is a block diagram illustrating a configuration of a drying apparatus 100 according to an embodiment.

[0035] The drying apparatus 100 may be an apparatus for removing moisture of a material to be dried. For example, the drying apparatus 100 may evaporate moisture of the material to be dried using heat or wind. In this case, the drying apparatus 100 may evaporate moisture of the material to be dried y generating heat or wind by gas or electrical power. Particularly, the drying apparatus 100 may include a fan and evaporate moisture by generating hot air by the fan.

[0036] In addition, the drying apparatus 100 may separate the moisture mechanically. For example, the drying apparatus 100 may remove moisture centrifugally by high-speed rotation. In addition, the drying apparatus 100 may be implemented to use the method described above complexly and may be any apparatus, as long as it is an apparatus for removing moisture.

[0037] Referring to FIG. 1, the drying apparatus 100 may include a drying unit 110 and a processor 120.

[0038] The drying unit 110 may be a constituent element for removing moisture. For example, the drying unit 110 may be implemented as a fan for generating wind. In addition, the drying unit 110 may be an apparatus for generating heat. In this case, the drying unit 110 may include a fan and generate hot air. In addition, the drying unit 110 may be implemented to be able to perform high-speed rotation. In this case, the drying unit 110 may include a space to which a material to be dried is input.

[0039] Hereinafter, for convenience of description, it is described that the drying unit 110 dries the material to be dried with hot air. However, the disclosure is not limited thereto, and in a case where the drying unit 110 uses wind or performs high-speed rotation, the embodiment may be implemented without a part related to a temperature in the following description.

[0040] The processor 120 may generally control the operation of the drying apparatus 100. Specifically, the processor 120 may be connected to each constituent element of the drying apparatus 100 to generally control the operation of the drying apparatus 100. For example, the processor 120 may be connected to the constituent elements such as the drying unit 110, a memory (not illustrated), a display (not illustrated), a communication interface (not illustrated), and the like to control the operations of the drying apparatus 100.

[0041] According to an embodiment, the processor 120 may be implemented as a digital signal processor (DSP), a microprocessor, or a time controller (TCON). However, there is no limitation thereto, and the processor 120 may include one or more of a central processing unit (CPU), a microcontroller unit (MCU), a microprocessing unit (MPU), a controller, an application processor (AP), or a communication processor (CP), and an ARM processor or may be defined as the corresponding term. In addition, the processor 120 may be implemented as System on Chip (SoC) or large scale integration (LSI) including the processing algorithm or may be implemented in form of a field programmable gate array (FPGA).

[0042] When a drying command is received, the processor 120 may identify whether the drying command is an initial drying command for a material to be dried (for ease of explanation referred to as a first material to be dried) or an additional drying command for the first material to be dried.

[0043] For example, the drying apparatus 100 may further include a memory storing weight information on a second material to be dried immediately before receiving the drying command and humidity information on the second material to be dried. The processor 120 may identify at least one of the weight information or the humidity information on the first material to be dried, and identify

whether the drying command is the initial drying command or the additional drying command based on the identified information and the information stored in the memory. When a difference between the weight of the first material to be dried and the weight of the second material to be dried is within a first threshold value, the processor 120 may identify that the first material to be dried is the same as the second material to be dried and identify that the drying command is the additional drying command. In addition, when a difference between the humidity of the first material to be dried and the humidity of the second material to be dried is within a second threshold value, the processor 120 may identify that the first material to be dried is the same as the second material to be dried and identify that the drying command is the additional drying command. Further, the processor 120 may identify that the drying command is the initial drying command or the additional drying command by comparing all of weights and humidity of the first material to be dried and the second material to be dried.

[0044] The memory may further store opening and closing information on a door after the drying operation immediately before receiving the drying command, and the processor 120 may identify whether the drying command is the initial drying command or the additional drying command by further considering the opening and closing information on the door. For example, although the weight difference between the first material to be dried and the second material to be dried is within the first threshold value and the humidity difference between the first material to be dried and the second material to be dried is within the second threshold value, if a difference between the opening and closing time of the door after the drying operation of the second material to be dried and the opening and closing time of the door before inputting the first material to be dried exceeds threshold time, the processor 120 may identify that the first material to be dried is different from the second material to be dried.

[0045] However, there is no limitation thereto, and the drying apparatus 100 may include a plurality of buttons for each of the initial drying command and the additional drying command. In this case, a user may manipulate a button corresponding to the additional drying command and the drying apparatus 100 may perform an additional drying operation for the first material to be dried according to the additional drying command.

[0046] When the drying command is the additional drying command, the processor 120 may control the drying unit 110 to perform the additional drying operation for the first material to be dried based on a drying operation method corresponding to a previous drying command for the first material to be dried. In other words, when it is identified to perform the additional drying operation for the first material to be dried, the processor 120 may perform the additional drying operation by changing an option of the previous drying operation method for the first material to be dried.

[0047] When the drying command is the additional drying command and a drying level of the drying operation method is a threshold level or higher, the processor 120 may control the drying unit 110 to perform the additional drying operation based on the drying operation method. Here, the drying level may represent one of a plurality of drying times by a drying course and the drying course may be classified based on at least one of a type or a drying method of a material to be dried.

[0048] For example, the drying apparatus 100 may provide a plurality of drying courses such as standard drying, rapid drying, shirt drying, time drying, AI-customized drying, delicate clothes drying, wool drying, bed sheets drying, towel drying, wind drying, and the like. Each of the plurality of drying courses may provide a plurality of drying levels. For example, the shirt course may provide a plurality of drying levels such as very, more, normal, less, and damp. The drying time may be reduced in sequence from "very" to "damp". In addition, although it is at the same drying level, the drying time may vary depending on the drying course. For example, "very" of the bed sheets course may have a drying time longer than "very" of the wool course.

[0049] However, the disclosure is not limited thereto, and the plurality of drying courses may be changed or added. In addition, some of the plurality of drying courses may provide a single drying level. In addition, the drying level may also be implemented by other methods such as "high, middle, low".

[0050] In the above example, when the drying command is the additional drying command and the drying level of the drying operation method corresponding to the previous drying command is "normal" or higher (e.g., very, more, normal), the processor 120 may control the drying unit 110 to perform the additional drying operation based on the drying operation method.

[0051] For example, when the drying command is the additional drying command, the processor 120 may control the drying unit 110 to perform the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method corresponding to the previous drying command.

[0052] In addition, when the drying operation method corresponding to the previous drying command is a predetermined first drying course among the plurality of drying courses, the processor 120 may change at least one of the drying time or the drying end determination condition, and the drying temperature, and when the drying operation method corresponding to the previous drying command is a second drying course which is the remaining course of the plurality of drying courses, the processor 120 may change at least one of the drying time or the drying end determination condition. In other words, in a case of the predetermined first drying course, the processor 120 may necessarily change the drying temperature.

[0053] For example, when the drying operation method corresponding to the previous drying command is the bed sheets course, the processor 120 may necessarily increase the drying temperature, in addition to the operation of changing at least one of the drying time or the drying end determination condition. In addition, when the drying operation method corresponding to the previous drying command is the wool course, the processor 120 may change at least only one of the drying time or the drying end determination condition. It is because the wool may have a problem of shrinkage, when the temperature is increased, whereas the shrinkage problem of the bed sheets is not significant, even when the temperature is increased.

[0054] Meanwhile, when the drying command is the additional drying command and the drying level of the drying operation method is less than the threshold level, the processor 120 may provide a message for rechecking the drying level to the user.

[0055] In the above example, when the drying command is the additional drying command and the drying level of the drying operation method corresponding to the previous drying command is lower than "normal" (e.g., less, damp), the processor 120 may provide a message for rechecking the drying level to the user. This is to identify the user's intent for the additional drying command, since the initial drying command was a command requesting for a state where the material to be dried contains moisture to some extent. In other words, in order to check whether the user changed his/her mind and wants to dry the material to be dried to have no moisture, or whether the user wants the material to be dried to contain moisture to some extent but to be dried more than the current state, the processor 120 may provide the message for rechecking the drying level to the user.

[0056] When the drying level is input from the user, the processor 120 may control the drying unit 110 to perform the additional drying operation based on the drying operation method and the input drying level. In other words, when it is identified to perform the additional drying operation for the first material to be dried, the processor 120 may determine the drying level based on the information input from the user, while performing the additional drying operation by changing the option of the previous drying operation method of the first material to be dried.

[0057] When the drying command is the additional drying command and the drying level of the drying operation method corresponding to the drying command is lower than the threshold level, the processor 120 may control the drying unit 110 to perform the additional drying operation for the first material to be dried, by changing at least one of the drying method, the drying end determination condition, or the drying time corresponding to the input drying level of the drying operation method.

[0058] In addition, when the drying operation method corresponding to the previous drying command is the predetermined first drying course of the plurality of drying courses, the processor 120 may change at least one of the drying end determination condition or the drying time corresponding to the input drying level, and the drying temperature, and when the drying operation method corresponding to the previous drying command is the second drying course which is the remaining course of the plurality of drying courses, the processor 120 may change at least one of the drying end determination condition or the drying time corresponding to the input drying level.

[0059] In other words, the processor 120 may change the drying temperature based on the drying course of the drying operation method corresponding to the previous drying command. In addition, the processor 120 may perform the additional drying operation by changing one of the drying time corresponding to the previous drying level or the drying time corresponding to a drying level newly input from the user, based on the drying level of the drying operation method corresponding to the previous drying command.

[0060] Meanwhile, when the drying command is the additional drying command, the processor 120 may identify the number of times that the additional drying command is input, and when the number of times that the additional drying command is input is two or more, the processor 120 may control the drying unit 110 to perform the additional drying operation for the first material to be dried based on the drying operation method corresponding to the initial drying command and a drying operation method corresponding to at least one additional drying command before the drying command. In other words, when the additional drying command is input two or more times, the processor 120 may perform the additional drying operation by considering all previous drying operation methods.

[0061] However, the disclosure is not limited thereto, and when the additional drying command is input two or more times, the processor 120 may perform the additional drying operation by considering only the latest drying operation method.

[0062] FIG. 2 is a block diagram illustrating a specific configuration of the drying apparatus 100 according to an embodiment.

[0063] The drying apparatus 100 may include the drying unit 110 and the processor 120. In addition, referring to FIG. 2, the drying apparatus 100 may further include a memory 130, a display 140, a user interface 150, a communication interface 160, and a speaker 170. The description of the parts of the constituent elements illustrated in FIG. 2 overlapped with the constituent elements illustrated in FIG. 1 will not be repeated.

[0064] The memory 130 may refer to hardware storing information such as data in an electric or magnetic manner so that the processor 120 and the like can access it. For this, the memory 130 may be implemented at least one of a non-volatile memory, a volatile memory, a flash memory, a hard disk drive (HDD), a solid-state drive (SSD), a RAM, a ROM, and the like.

[0065] The memory 130 may store at least one instruction or module necessary for the operation of the drying apparatus 100 or the processor 120. Herein, the instruction is a symbol unit instructing the operation of the drying apparatus 100 or the processor 120 and may be written in machine language which is a language that the computer is able to understand. The module may be a series of instruction set for performing a specific operation in a job unit.

[0066] The memory 130 may store data which is information in a bit or byte unit capable of representing a text, number, image, or the like. For example, the memory 130 may store information on the material to be dried. In addition, the memory 130 may store a drying command type identification module, a drying operation module, and the like. Herein, each module may be implemented as a rule-based model or may be implemented as a neural network model.

[0067] The memory 130 may be accessed by the processor 120 and reading, recording, editing, deleting, or updating of the instruction, the module, or the data by the processor 120 may be executed.

[0068] The function related to the artificial intelligence according to the disclosure is operated by the processor 120 and the memory 130.

[0069] The processor 120 may be formed of one or a plurality of processors. The one or the plurality of processors may be a general-purpose processor such as a CPU, an AP, or a digital signal processor (DSP), a graphic dedicated processor such as a GPU or a vision processing unit (VPU), or an artificial intelligence dedicated processor such as an NPU, or the like.

[0070] The one or the plurality of processors may perform control to process the input data according to a predefined action rule or an artificial intelligence model stored in the memory. In addition, if the one or the plurality of processors are artificial intelligence dedicated processors, the artificial intelligence dedicated processor may be designed to have a hardware structure specialized in processing of a specific artificial intelligence model. The predefined action rule or the artificial intelligence model is formed through training.

[0071] Being formed through training herein may, for example, imply that a predefined action rule or an artificial intelligence model set to perform a desired feature (or object) is formed by training a basic artificial intelligence model using a plurality of pieces of learning data by a learning algorithm. Such training may be performed in a device demonstrating artificial intelligence according to the disclosure or performed by a separate server and/or system. Examples of the learning algorithm include supervised learning, unsupervised learning, semi-supervised learning, or reinforcement learning, but is not limited to these examples.

[0072] The artificial intelligence model may include a plurality of neural network layers. The plurality of neural network layers have a plurality of weight values, respectively, and execute neural network processing through a processing result of a previous layer and processing between the plurality of weights. The plurality of weights of the plurality of neural network layers may be optimized by the training result of the artificial intelligence model. For example, the plurality of weights may be updated to reduce or to minimize a loss value or a cost value obtained by the artificial intelligence model during the training process.

[0073] The artificial neural network may include deep neural network (DNN), and, for example, include a convolutional neural network (CNN), deep neural network (DNN), recurrent neural network (RNN), restricted Boltzmann machine (RBM), deep belief network (DBN), bidirectional recurrent deep neural network (BRDNN), or deep Q-network, but there is no limitation to these examples.

[0074] The display 140 may be implemented as various types of displays such as liquid crystal display (LCD), organic light emitting diodes (OLED) display, plasma display panel (PDP), and the like. The display 140 may also include a driving circuit or a backlight unit which may be implemented in a form of a-si TFT, a low temperature poly silicon (LTPS) TFT, or an organic TFT (OTFT). Meanwhile, the display 140 may be implemented as a touch screen by combining with a touch sensor, a flexible display, a 3D display, or the like.

[0075] The user interface 150 may be implemented as a button, a touch pad, a mouse, and a keyboard, and may also be implemented as a touch screen capable of performing the display function and the manipulation input function. The button may be various types of buttons such as a mechanical button, a touch pad, or a wheel formed in any region of a front portion, a side portion, or a rear portion of the appearance of the main body of the drying apparatus 100. The user may input the drying command through the user interface 150.

[0076] The communication interface 160 is a constituent element for performing communication with various types of external apparatuses according to various types of communication methods. For example, the drying apparatus 100 may receive the user command for controlling the drying apparatus 100 from the external apparatus through the communication interface 160.

[0077] The communication interface 160 may include a Wi-Fi module, a Bluetooth module, an infrared communication module, a wireless communication module, and the like. Each communication module may be implemented as at least one hardware chip.

[0078] The Wi-Fi module and the Bluetooth module may perform communication by a Wi-Fi method and a Bluetooth method, respectively. In a case of using the Wi-Fi module or the Bluetooth module, various pieces of connection information such as SSID or session key may be transmitted or received first to allow the communication connection by using these, and then various pieces of information may be transmitted and received. The infrared communication module may perform communication according to a technology of infrared communication

(infrared Data Association (IrDA)) for transmitting data in a close range wirelessly by using infrared rays between visible rays and millimeter waves.

[0079] The wireless communication module may include at least one communication chip for performing communication according to various wireless communication standard such as zigbee, 3rd Generation (3G), 3rd Generation Partnership Project (3GPP), Long Term Evolution (LTE), LTE Advanced (LTE-A), 4th Generation (4G), 5th Generation (5G), and the like, in addition to the above communication method.

[0080] The communication interface 160 may include a wired communication interface such as HDMI, DP, Thunderbolt, USB, RGB, D-SUB, DVI, or the like.

[0081] In addition, the communication interface 160 may include at least one of wired communication modules for performing communication by using a local area network (LAN) module, an Ethernet module, pair cables, a coaxial cable, to an optical fiber cable.

[0082] The speaker 170 is a constituent element which outputs not only various audio data processed in the processor 120, but also various alerts or voice messages. The processor 120 may output a sound indicating an operation state of the drying apparatus 100, a sound indicating that the operation state is changed, a request sound for rechecking a drying level, and the like through the speaker 170.

[0083] Meanwhile, although not illustrated in FIG. 2, the drying apparatus 100 may include a space for accommodating the material to be dried. For example, the drying apparatus 100 may include a space for accommodating the material to be dried in a form of a drying basket or a drying drum.

[0084] However, the disclosure is not limited thereto, and the spaces for accommodating the drying apparatus 100 and the material to be dried may be separated. In this case, a separate apparatus including a space for accommodating the material to be dried is provided, and the drying apparatus 100 may be disposed in adjacent to the separate apparatus and perform the drying operation by supplying hot air to the space where the material to be dried is accommodated.

[0085] As described above, when the additional drying command is input, the drying apparatus 100 performs the additional drying operation based on the previous drying operation method, which makes it possible to perform efficient drying while preventing damage on the material to be dried.

[0086] Hereinafter, the operation of the drying apparatus 100 will be described in more detail with reference to FIGS. 3 to 8. For convenience of description, individual embodiments will be described with reference to FIGS. 3 to 8. However, the individual embodiments of FIGS. 3 to 8 may be practice in a combined state.

[0087] FIG. 3 is a flowchart illustrating an additional drying operation according to an embodiment.

[0088] First, the processor 120 may start the drying operation (S310). For example, when a drying command is received from the user, the processor 120 may start the drying operation according to the received drying command. Herein, the drying operation may be the initial drying operation and the additional drying operation.

[0089] Then, the drying operation ends (S320) and the processor 120 may identify whether it is necessary to perform the additional drying (S330). For example, the processor 120 may receive the additional drying command from the user. In addition, the processor 120 may receive the drying command from the user, identify whether a material to be dried that is currently input is a target of the drying operation within the threshold time, and identify whether to perform the additional drying. Further, after the drying operation ends, the processor 120 may detect a humidity of the material to be dried, and when the detected humidity is a threshold humidity or more, the processor 120 may provide a message suggesting the additional drying to the user. Hereinafter, for convenience of description, it is described that the user inputs the additional drying command.

[0090] When it is identified that it is not necessary to perform the additional drying, the processor 120 may end the drying operation, and when it is identified that it is necessary to perform the additional drying and the material to be dried is input to the drying apparatus 100 (S340), the processor 120 may identify whether it is the same material to be dried (S350).

[0091] For example, when the drying operation ends, the processor 120 may detect at least one of the weight or the humidity of the material to be dried, and store the detected information in the memory 130. In addition, when the additional drying command is received from the user and the material to be dried is input to the drying apparatus 100, the processor 120 may detect at least one of the weight or the humidity of the input material to be dried. The processor 120 may identify whether the input material to be dried is the same as the previous material to be dried by comparing results of two times of detection.

[0092] When it is identified as the same material to be dried, the processor 120 may identify that the drying level of the previous drying is the threshold level or higher (S360). When the drying level of the previous drying is lower than the threshold level, the processor 120 may recheck the drying level to the user (S370). Then, the processor 120 may change the drying option based on the drying level input from the user (S390).

[0093] In addition, when the drying level of the previous drying is the threshold level or higher, the processor 120 may identify the drying option to be changed by using previous course information. For example, the processor 120 may change the drying temperature based on whether the previous course information is a drying course delicate to the temperature. In a case of fabric such as wool, the fabric may shrink during the high-temperature drying, and accordingly, the processor 120 may maintain the drying temperature in a case of wool course. In contrast, when the previous course information is a drying course

of bed sheets or towels that are not delicate to the temperature, the processor 120 may increase the drying temperature for complete drying.

[0094] In addition, when the previous course information is the drying course in which the drying level is able to be set, the processor 120 may change the drying time based on the drying level.

[0095] In addition, in a case of a drying course in which the end of drying is determined based on moisture separately from the time, such as AI drying, the processor 120 may change the drying end determination condition. For example, the drying apparatus 100 may include at least one sensor which detects moisture of the material to be dried, and the processor 120 may determine whether to end the drying based on the number of times that the at least one sensor detects the moisture during a certain time period.

[0096] In the most drying courses, the drying operation may end based on one of the drying time and the drying end determination condition. In other words, the processor 120 may change one of the drying time and the drying end determination condition. However, the disclosure is not limited thereto, and the processor 120 may end the drying operation at an earlier stage of an elapse of the drying time or satisfaction of the drying end determination condition.

[0097] In addition, even when the drying operation ends based on the drying time in the previous drying operation, the processor 120 may end the drying operation based on the drying end determination condition in the additional drying operation.

[0098] The processor 120 may change the drying option (S390) and perform the additional drying operation based on the changed drying option (S310). For example, in a case of changing the drying temperature, the processor 120 may change the drying temperature to a highest temperature. In a case where, when the temperature of the hot air is 39 degrees, the drying unit 110 is turned on, and when the temperature of the hot air is 45 degrees, the drying unit 110 is turned off during the previous drying operation, the processor 120 may turn on the drying unit 110, when the temperature of the hot air is 45 degrees during the additional drying operation, and turn off the drying unit 110, when the temperature of the hot air is 52 degrees. In other words, the processor 120 may perform the drying more reliably by increasing the temperature of the hot air operated by the drying unit 110.

[0099] In addition, the processor 120 may change the drying time and in this case, the change the drying time based on the drying level of the previous drying operation or the drying level input from the user. For example, when the drying time is changed based on the drying level of the previous drying operation, the processor 120 may perform the additional drying operation during a drying time obtained by reducing the drying time corresponding to the drying level of the previous drying operation at a threshold ratio. In addition, in a case of changing the drying time based on the drying level input from the user, the processor 120 may perform the additional drying operation during the drying time obtained by reducing the drying time corresponding to the drying level input from the user at a threshold ratio.

[0100] Further, the processor 120 may change the drying end determination condition by reinforcing it even more. For example, the drying apparatus 100 includes at least one sensor which detects the moisture of the material to be dried. If a case where the number of times that the at least one sensor detects the moisture for one minute during the previous drying operation is recorded as less than three times and this is continued two times is assumed as the drying end determination condition, the processor 120 may use a case where the number of times that the at least one sensor detects the moisture for one minute during the additional drying operation is recorded as less than three times and this is continued three times as the drying end determination condition. In addition, the processor 120 may also use a case where the number of times that the at least one sensor detects the moisture for one minute during the additional drying operation is recorded as less than two times and this is continued two times as the drying end determination condition.

[0101] In FIG. 3, it is described that the additional drying operation is performed in a case of the same material to be dried, but there is no limitation thereto. For example, when the additional drying command is received from the user, the processor 120 may perform the additional drying operation regardless whether it is the same material to be dried. In this case, the processor 120 may perform the additional drying operation for the material to be dried based on the drying operation method corresponding to the previous drying command.

[0102] FIG. 4 is a diagram illustrating drying courses and drying levels according to an embodiment.

[0103] Referring to FIG. 4, the drying apparatus 100 may provide a plurality of drying courses. In FIG. 4, for convenience of description, only the bed sheets course and the wool course are illustrated, but the drying apparatus 100 may provide various courses such as standard drying, rapid drying, shirt drying, time drying, AI-customized drying, delicate clothes drying, towel drying, wind drying, and the like.

[0104] In the bed sheets course, when the temperature of the hot air is 45 degrees, the drying unit 110 may be turned on, and when the temperature of the hot air is 52 degrees, the drying unit 110 may be turned off. In the wool course, when the temperature of the hot air is 39 degrees, the drying unit 110 may be turned on, and when the temperature of the hot air is 45 degrees, the drying unit 110 may be turned off.

[0105] However, there is no limitation thereto, and the temperatures of each course at which the drying unit 110 is turned on and off may be variously set.

[0106] In addition, in FIG. 4, for convenience of description, it is illustrated that each course is divided by the temperatures at which the drying unit 110 is turned

on and off. However, there is no limitation thereto, and if a drying drum is provided, each course may also have different rotation speeds of the drying drum, in addition to the temperature at which the drying unit 110 is turned on and off.

[0107] Meanwhile, the bed sheets course may provide very, more, normal, less, and damp as the drying levels and the wool course may also provide very, more, normal, less, and damp as the drying levels. Each of the other drying courses may provide very, more, normal, less, and damp as the drying levels. However, there is no limitation thereto, and some drying courses may not provide the drying levels.

[0108] In the drying level "very" in the bed sheets course, the drying time may be 95 minutes, and the drying time may be reduced as the level is changed to more, normal, less, and damp. In the drying level "very" in the wool course, the drying time may be 55 minutes, and the drying time may be reduced as the level is changed to more, normal, less, and damp.

[0109] In addition, in FIG. 4, for convenience of description, it is illustrated that the drying level is divided by the drying time, but there is no limitation thereto. For example, the drying level may be divided by the drying end determination condition described above. For example, in the drying level "very" in the bed sheets course, the case where the number of times that the at least one sensor detects moisture for one minute is recorded as less than three times and this continued five times is the drying end condition, and the number of times in the case where the number of times that the at least one sensor detects moisture for one minute is recorded as less than three times may be reduced as the level is changed to more, normal, less, and damp.

[0110] FIGS. 5 and 6 are diagrams illustrating an additional drying command according to various embodiments.

[0111] Referring to FIG. 5, the drying apparatus 100 may include the display 140 and the processor 120 may control the display 140 to display a message inquiring about additional drying to the user. However, there is no limitation thereto, and the processor 120 may output a sound inquiring about the additional drying to the user through the speaker 170.

[0112] The user may touch "OK" of FIG. 5 to input the additional drying command. In this case, the processor 120 may control the display 140 to display a message indicating that the additional drying operation is performed or output a sound indicating that the additional drying operation is performed through the speaker 170.

[0113] In addition, referring to FIG. 6, the drying apparatus 100 may include a first button 510 and a second button 520, in addition to the display 140. When the first button 510 is manipulated, the processor 120 may identify that the initial drying command is input, and when the second button 520 is manipulated, the processor may identify that the additional drying command is input. In addition, the drying apparatus 100 may include a plurality of buttons and identify that the additional drying command is input by manipulation of two or more buttons.

[0114] However, there is no limitation thereto, and the drying apparatus 100 may include a user interface in various forms and receive an input of the additional drying command. For example, the drying apparatus 100 may include an interface in a form different from the button, such as a dial or the like, and identify that the additional drying command is input by the manipulation of dials. In addition, the drying apparatus 100 may include a touch display and identify that the additional drying command is input by the manipulation of the touch display.

[0115] FIG. 7 is a diagram illustrating an artificial intelligence model which identifies a type of a drying command according to an embodiment.

[0116] Referring to FIG. 7, the processor 120 may identify a type of the drying command 730 by using a first artificial intelligence model 720. Specifically, the processor 120 may obtain the type of the drying command 730 as output data by inputting drying history data 710 to the first artificial intelligence model 720 as input data. Here, the drying history data 710 may include at least one of weight information on the material to be dried, humidity information on the material to be dried, or opening and closing information of a door. Here, the material to be dried may include both the material to be dried during the previous drying operation and the current material to be dried.

[0117] The first artificial intelligence model 720 may be a model trained on an external server. However, there is no limitation thereto, and the processor 120 may additionally train the trained first artificial intelligence model 720 in real time. For example, even when the drying command is identified as the additional drying command through the first artificial intelligence model 720, when a command for canceling the additional drying is input from the user, the processor 120 may update the first artificial intelligence model 720 according to the canceling command.

[0118] FIG. 8 is a diagram illustrating an artificial intelligence model which identifies a drying option according to an embodiment.

[0119] Referring to FIG. 8, the processor 120 may identify a drying option 830 using a second artificial intelligence model 820. Specifically, the processor 120 may obtain the drying option 830 as the output data by inputting drying option data 810 to the second artificial intelligence mode 820 as the input data. Here, the drying option data 810 may include at least one of the drying course or the drying level.

[0120] The second artificial intelligence model 820 may be a model trained on an external server. However, there is no limited thereto, and the processor 120 may additionally train the trained second artificial intelligence model 820 in real time. For example, even when the drying option is identified through the second artificial intelligence model 820, when a command for changing the drying option is input from the user, the processor 120

may update the second artificial intelligence model 820 according to the change command.

[0121] FIG. 9 is a flowchart illustrating a method for controlling a drying apparatus according to an embodiment.

[0122] First, a drying command is received (S910). It is identified whether the drying command is an initial drying command for a first material to be dried or an additional drying command for the first material to be dried (S920). Based on the drying command being the additional drying command, an additional drying operation for the first material to be dried is performed based on a drying operation method corresponding to a previous drying command for the first material to be dried (S930).

[0123] Herein, the method may further include storing weight information on a second material to be dried that is dried immediately before the drying command is received, and humidity information on the second material to be dried, and the identifying (S920) may include identifying at least one of weight information or humidity information on the first material to be dried, and identifying whether the drying command is the initial drying command or the additional drying command based on the identified information and the stored information.

[0124] The storing may include storing opening and closing information of a door after a drying operation immediately before the drying command is received, and the identifying (S920) may include identifying whether the drying command is the initial drying command or the additional drying command by further considering the opening and closing information of the door.

[0125] Meanwhile, the performing the additional drying operation (S930) may include, based on the drying command being the additional drying command and a drying level of the drying operation method being a threshold level or higher, performing the additional drying operation based on the drying operation method, the drying level may represent one of a plurality of drying times for each drying course, and the drying course may be classified based on at least one of a type or a drying method of a material to be dried.

[0126] Herein, the performing the additional drying operation (S930) may include, based on the drying command being the additional drying command, performing the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method.

[0127] The performing the additional drying operation (S930) may include, based on the drying operation method being a predetermined first drying course among a plurality of drying courses, changing at least one of the drying time or the drying end determination condition and the drying temperature, and based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, changing at least one of the drying time or the drying end determination condition.

[0128] Meanwhile, the performing the additional drying operation (S930) may include, based on the drying command being the additional drying command and a drying level of the drying operation method being less than a threshold level, providing a message for rechecking the drying level to a user, and based on the drying level being input from the user, performing the additional drying operation based on the drying operation method and the input drying level, the drying level may represent one of a plurality of drying times for each drying course, and the drying course may be classified based on at least one of a type or a drying method of a material to be dried.

[0129] Herein, the performing the additional drying operation (S930) may include, based on the drying command being the additional drying command and the drying level of the drying operation method being less than the threshold level, performing the additional drying operation for the first material to be dried by changing at least one of a drying temperature, a drying end determination condition, or a drying time corresponding to the input drying level of the drying operation method.

[0130] The performing the additional drying operation (S930) may include, based on the drying operation method being a predetermined first drying course among a plurality of drying courses, changing at least one of the drying end determination condition or the drying time corresponding to the input drying level and the drying temperature, and based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, changing at least one of the drying end determination condition or the drying time corresponding to the input drying level.

[0131] The method may further include, based on the drying command being the additional drying command, identifying the number of times that the additional drying command is input, and the performing the additional drying command (S930) may include, based on the number of times that the additional drying command is input being two or more times, performing the additional drying operation for the first material to be dried based on a drying operation method corresponding to the initial drying command and a drying operation method corresponding to at least one additional drying command before the drying command.

[0132] According to various embodiments described above, the drying apparatus may perform the additional drying operation based on the previous drying operation method, when the additional drying command is input, thereby enabling efficient drying while preventing the damage on the material to be dried.

[0133] In addition, as the drying apparatus identifies whether the drying command of the user is the additional drying command, a user's convenience is enhanced.

[0134] Meanwhile, according to an embodiment of the disclosure, various embodiments of the disclosure may be implemented as software including instructions stored in machine (e.g., computer)-readable storage media. The machine is an apparatus which invokes instructions

stored in the storage medium and is operated according to the invoked instructions, and may include an electronic apparatus (e.g., electronic apparatus A) according to the disclosed embodiments. In a case where the instruction is executed by a processor, the processor may perform a function corresponding to the instruction directly or using other elements under the control of the processor. The instruction may include a code made by a compiler or a code executable by an interpreter. The machine-readable storage medium may be provided in a form of a non-transitory storage medium. Here, the "non-transitory" storage medium is tangible and may not include signals, and it does not distinguish that data is semi-permanently or temporarily stored in the storage medium.

[0135] According to an embodiment, the methods according to various embodiments disclosed in this disclosure may be provided in a computer program product. The computer program product may be exchanged between a seller and a purchaser as a commercially available product. The computer program product may be distributed in the form of a machine-readable storage medium (e.g., compact disc read only memory (CD-ROM)) or distributed online through an application store (e.g., PlayStoreTM). In a case of the on-line distribution, at least a part of the computer program product may be at least temporarily stored or temporarily generated in a storage medium such as a memory of a server of a manufacturer, a server of an application store, or a relay server.

[0136] According to an embodiment of the disclosure, the embodiments described above may be implemented in a recording medium readable by a computer or a similar device using software, hardware, or a combination thereof. In some cases, the embodiments described in this specification may be implemented as a processor itself. According to the implementation in terms of software, the embodiments such as procedures and functions described in this specification may be implemented as separate software modules. Each of the software modules may perform one or more functions and operations described in this specification.

[0137] Computer instructions for executing processing operations according to the embodiments of the disclosure descried above may be stored in a non-transitory computer-readable medium. When the computer instructions stored in such a non-transitory computer-readable medium are executed by the processor, the computer instructions may enable a specific machine to execute the processing operations according to the embodiments described above. The non-transitory computer-readable medium is not a medium storing data for a short period of time such as a register, a cache, or a memory, but may refer to a medium that semi-permanently stores data and is readable by a machine. Specific examples of the non-transitory computer-readable medium may include a CD, a DVD, a hard disk drive, a Blu-ray disc, a USB, a memory card, and a ROM.

[0138] Each of the elements (e.g., a module or a program) according to various embodiments described above may include a single entity or a plurality of entities, and some sub-elements of the abovementioned sub-elements may be omitted or other sub-elements may be further included in various embodiments. Alternatively or additionally, some elements (e.g., modules or programs) may be integrated into one entity to perform the same or similar functions performed by each respective element prior to the integration. Operations performed by a module, a program, or other elements, in accordance with various embodiments, may be performed sequentially, in a parallel, repetitive, or heuristically manner, or at least some operations may be performed in a different order, omitted, or may add a different operation.

[0139] While preferred embodiments of the disclosure have been shown and described, the disclosure is not limited to the aforementioned specific embodiments, and it is apparent that various modifications can be made by those having ordinary skill in the technical field to which the disclosure belongs, without departing from the gist of the disclosure as claimed by the appended claims. Also, it is intended that such modifications are not to be interpreted independently from the technical idea or prospect of the disclosure.

Claims

1. A drying apparatus comprising:

a drying unit; and

a processor configured to control an operation of the drying unit, wherein the processor is configured to:

based on a drying request being received, identify whether the drying request is an initial drying request for a material to be dried or an additional drying request for the material to be dried; and

based on the drying request being identified as the additional drying request, control the drying unit to perform an additional drying operation for the material to be dried based on a drying operation method corresponding to a previous drying request for the material to be dried.

2. The drying apparatus according to claim 1, wherein the material to be dried is a first material to be dried and the drying apparatus further comprises:

a memory to store weight information associated with a second material to be dried that is dried immediately before the drying request is received and humidity information associated with the second material to be dried,

wherein the processor is configured to:

identify at least one of weight information or humidity information associated with the first material to be dried; and
identify whether the drying request is the initial drying request or the additional drying request based on the identified information and the information stored in the memory.

3. The drying apparatus according to claim 2, wherein the memory further stores opening and closing information of a door of the drying apparatus after a drying operation immediately before the drying request is received, and
wherein the processor is configured to identify whether the drying request is the initial drying request or the additional drying request by further considering the opening and closing information of the door.

4. The drying apparatus according to claim 1, wherein the processor is configured to:

based on the drying request being the additional drying request and a drying level of the drying operation method being at a threshold level or higher, control the drying unit to perform the additional drying operation based on the drying operation method;
wherein the drying level represents one of a plurality of drying times for each drying course, and wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

5. The drying apparatus according to claim 4, wherein the processor is configured to:
based on the drying request being the additional drying request, control the drying unit to perform the additional drying operation for the material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method.

6. The drying apparatus according to claim 5, wherein the processor is configured to:

based on the drying operation method being a predetermined first drying course among a plurality of drying courses, change at least one of the drying time or the drying end determination condition and the drying temperature; and
based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, change at least one of the drying time or the drying end determination condition.

7. The drying apparatus according to claim 1, wherein the processor is configured to:

based on the drying request being the additional drying request and a drying level of the drying operation method being less than at a threshold level, provide a message for rechecking the drying level to a user; and
based on the drying level being input from the user, control the drying unit to perform the additional drying operation based on the drying operation method and the input drying level,
wherein the drying level represents one of a plurality of drying times for each drying course, and wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

8. The drying apparatus according to claim 7, wherein the processor is configured to, based on the drying request being the additional drying request and the drying level of the drying operation method being less than at the threshold level, control the drying unit to perform the additional drying operation for the material to be dried by changing at least one of a drying temperature, a drying end determination condition, or a drying time corresponding to the input drying level of the drying operation method.

9. The drying apparatus according to claim 8, wherein the processor is configured to:

based on the drying operation method being a predetermined first drying course among a plurality of drying courses, change at least one of the drying end determination condition or the drying time corresponding to the input drying level and the drying temperature; and
based on the drying operation method being a second drying course which is a remaining course of the plurality of drying courses, change at least one of the drying end determination condition or the drying time corresponding to the input drying level.

10. The drying apparatus according to claim 1, wherein the processor is configured to:

based on the drying request being the additional drying request, identify the number of times that the additional drying request is input; and
based on the number of times that the additional drying request is input being two or more times, control the drying unit to perform the additional drying operation for the material to be dried based on a drying operation method corresponding to the initial drying request and a drying operation method corresponding to at least one additional drying request before the drying

request.

11. A method for controlling a drying apparatus, the method comprising:

receiving a drying request;
identifying whether the drying request is an initial drying request for a material to be dried or an additional drying request for the material to be dried; and
based on the drying request being identified as the additional drying request, performing an additional drying operation for the material to be dried based on a drying operation method corresponding to a previous drying request for the first material to be dried.

12. The method according to claim 11, wherein the material to be dried is a first material to be dried and the method further comprises:

storing weight information associated with a second material to be dried that is dried immediately before the drying request is received, and humidity information associated with the second material to be dried,
wherein the identifying comprises:

identifying at least one of weight information or humidity information associated with the first material to be dried; and
identifying whether the drying request is the initial drying request or the additional drying request based on the identified information and the stored information.

13. The method according to claim 12, wherein the storing comprises storing opening and closing information of a door of the drying apparatus after a drying operation immediately before the drying request is received, and
wherein the identifying comprises identifying whether the drying request is the initial drying request or the additional drying request by further considering the opening and closing information of the door.

14. The method according to claim 11, wherein the performing the additional drying operation comprises, based on the drying request being the additional drying request and a drying level of the drying operation method being at a threshold level or higher, performing the additional drying operation based on the drying operation method,

wherein the drying level represents one of a plurality of drying times for each drying course, and
wherein the drying course is classified based on at least one of a type or a drying method of a material to be dried.

15. The method according to claim 14, wherein the performing the additional drying operation comprises, based on the drying request being the additional drying request, performing the additional drying operation for the material to be dried by changing at least one of a drying temperature, a drying time, or a drying end determination condition of the drying operation method.

FIG. 1

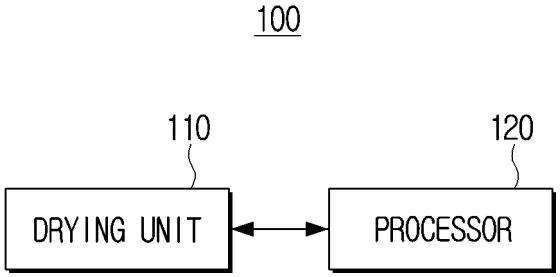


FIG. 2

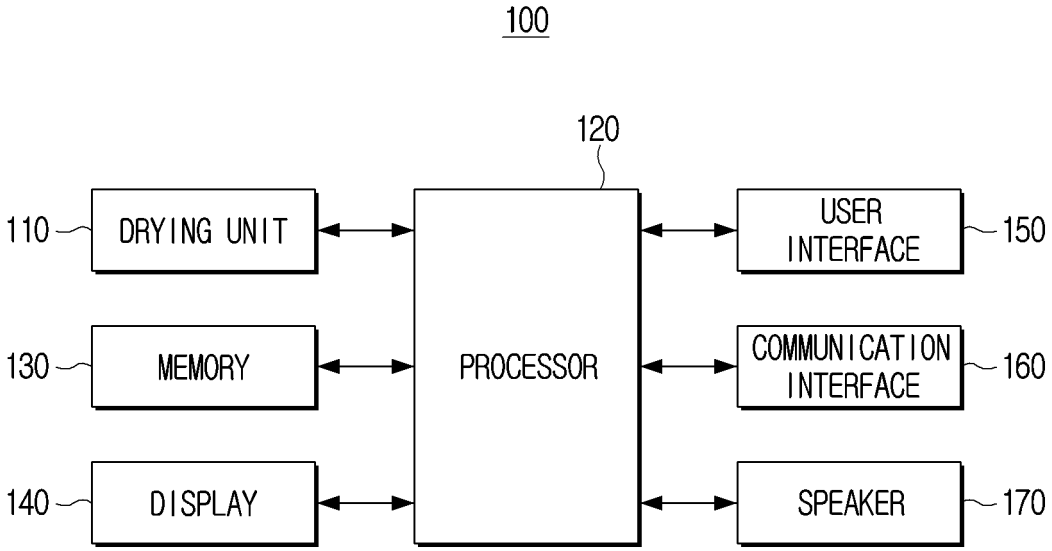

100
120
110
DRYING UNIT
130
MEMORY
140
DISPLAY
PROCESSOR
USER INTERFACE
150
COMMUNICATION INTERFACE
160
SPEAKER
170

FIG. 3

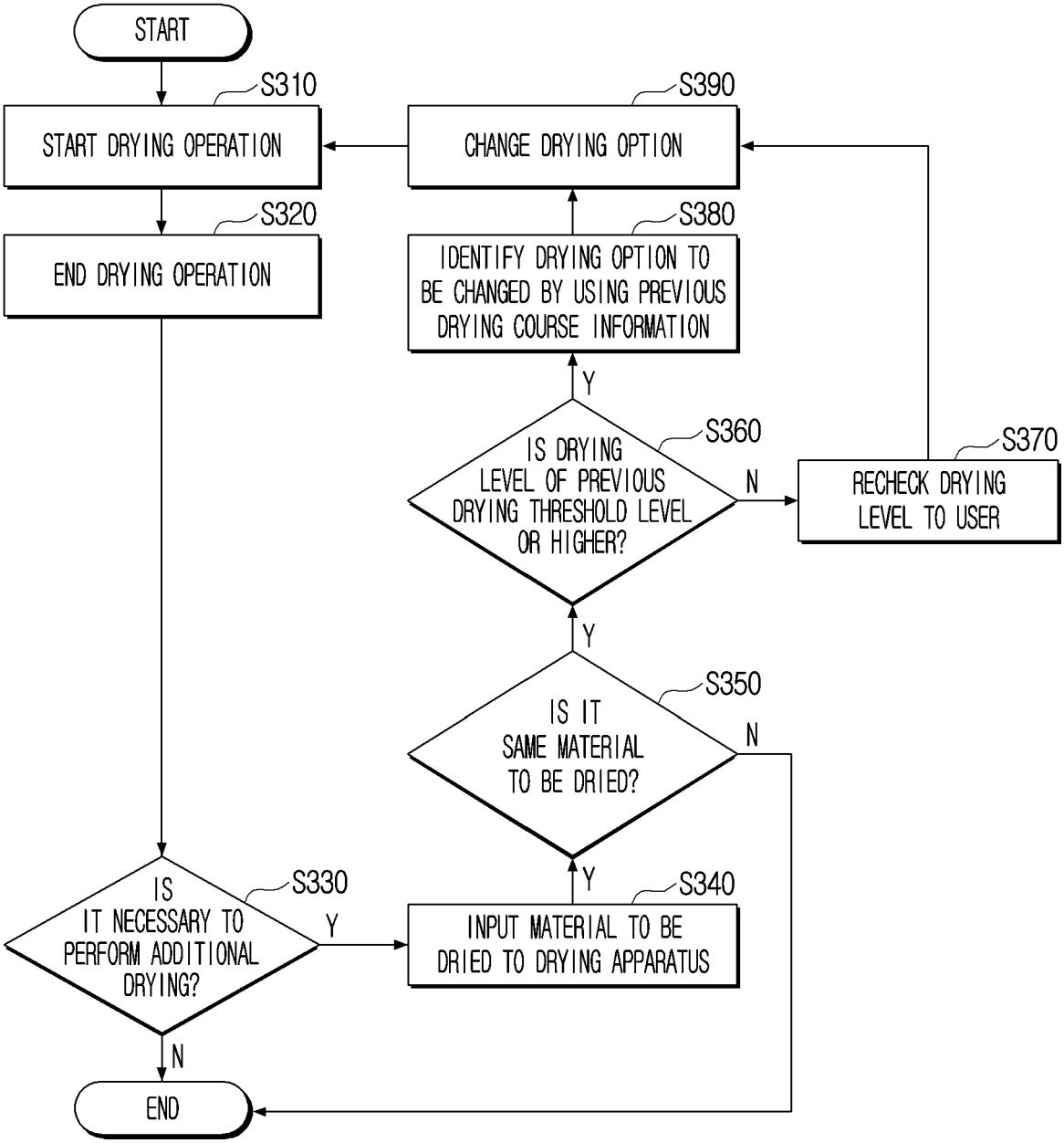

START
S310
START DRYING OPERATION
S320
END DRYING OPERATION
S330
IS IT NECESSARY TO PERFORM ADDITIONAL DRYING?
Y
N
END
S340
INPUT MATERIAL TO BE DRIED TO DRYING APPARATUS
Y
S350
IS IT SAME MATERIAL TO BE DRIED?
N
Y
S360
IS DRYING LEVEL OF PREVIOUS DRYING THRESHOLD LEVEL OR HIGHER?
N
Y
S370
RECHECK DRYING LEVEL TO USER
S380
IDENTIFY DRYING OPTION TO BE CHANGED BY USING PREVIOUS DRYING COURSE INFORMATION
S390
CHANGE DRYING OPTION

FIG. 4

DRYING COURSE	DRYING LEVEL	DRYING TIME	DRYING TEMPERATURE
BED SHEETS COURSE	VERY	95 MIN	HEATER ON 45 HEATER OFF 52
	MORE	86 MIN	
	NORMAL	77 MIN	
	LESS	73 MIN	
	DAMP	66 MIN	
WOOL COURSE	VERY	55 MIN	HEATER ON 39 HEATER OFF 45
	MORE	48 MIN	
⋮	⋮	⋮	

FIG. 5

FIG. 6

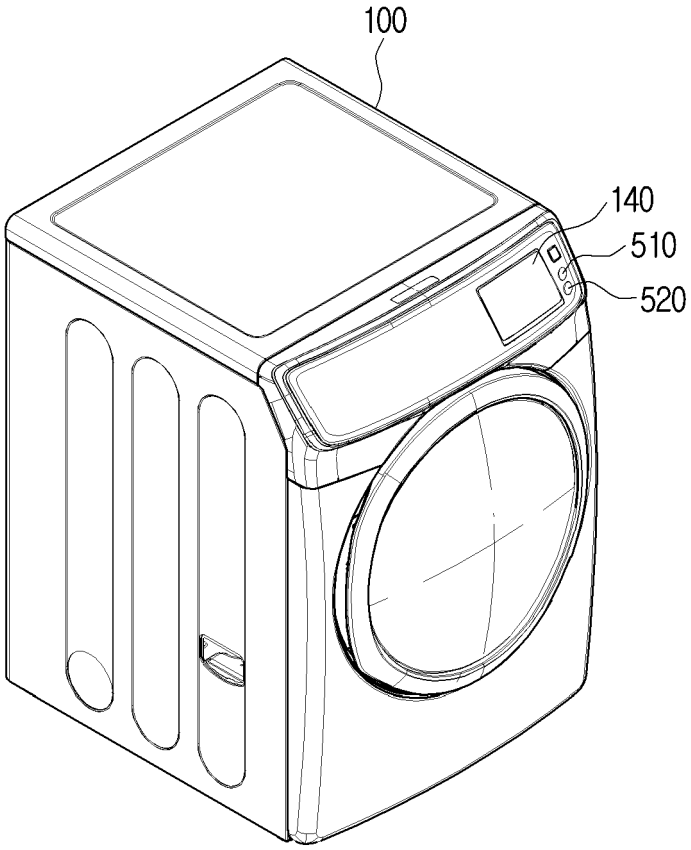


FIG. 7

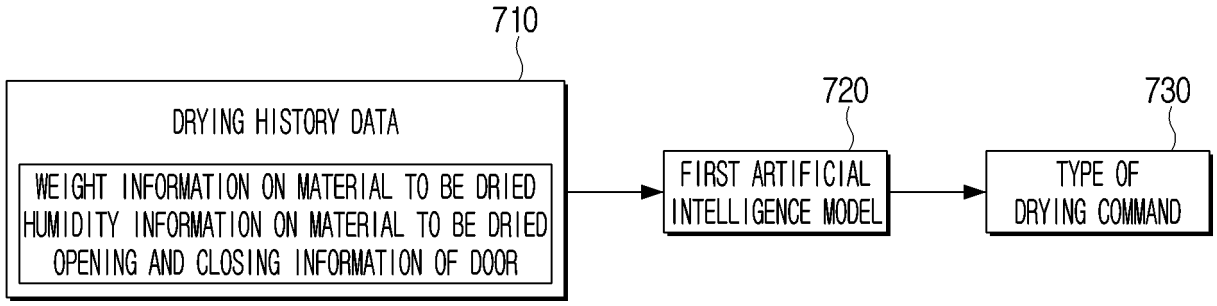

710
DRYING HISTORY DATA
WEIGHT INFORMATION ON MATERIAL TO BE DRIED
HUMIDITY INFORMATION ON MATERIAL TO BE DRIED
OPENING AND CLOSING INFORMATION OF DOOR
720
FIRST ARTIFICIAL INTELLIGENCE MODEL
730
TYPE OF DRYING COMMAND

FIG. 8

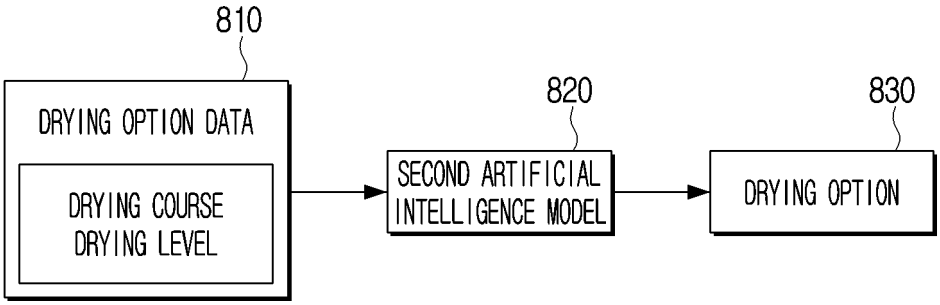
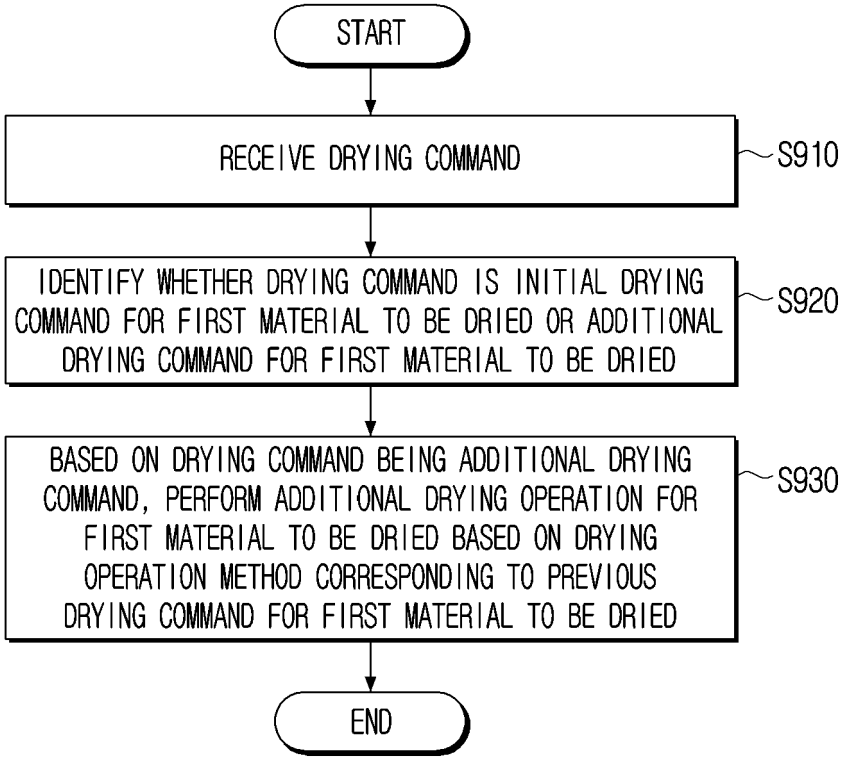

810
DRYING OPTION DATA
DRYING COURSE
DRYING LEVEL
820
SECOND ARTIFICIAL INTELLIGENCE MODEL
830
DRYING OPTION

FIG. 9


START
RECEIVE DRYING COMMAND
S910
IDENTIFY WHETHER DRYING COMMAND IS INITIAL DRYING COMMAND FOR FIRST MATERIAL TO BE DRIED OR ADDITIONAL DRYING COMMAND FOR FIRST MATERIAL TO BE DRIED
S920
BASED ON DRYING COMMAND BEING ADDITIONAL DRYING COMMAND, PERFORM ADDITIONAL DRYING OPERATION FOR FIRST MATERIAL TO BE DRIED BASED ON DRYING OPERATION METHOD CORRESPONDING TO PREVIOUS DRYING COMMAND FOR FIRST MATERIAL TO BE DRIED
S930
END

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/010532

A. CLASSIFICATION OF SUBJECT MATTER

D06F 58/38(2020.01)i; **D06F 34/18**(2020.01)i; **D06F 34/20**(2020.01)i; **D06F 34/05**(2020.01)i; **D06F 34/34**(2020.01)i; **D06F 34/30**(2020.01)i; **D06F 58/46**(2020.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F 58/38(2020.01); D06F 58/28(2006.01); D06F 58/30(2020.01); F26B 21/04(2006.01); F26B 3/02(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 건조 장치(drying apparatus), 프로세서(processor), 추가 건조(additional drying), 무게 정보(weight information), 습도 정보(humidity information)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2017-119217 A (TOSHIBA LIFESTYLE PRODUCTS & SERVICES CORP.) 06 July 2017 (2017-07-06) See paragraphs [0008]-[0052].	1-15
A	JP 2016-107063 A (SAMSUNG ELECTRONICS CO., LTD.) 20 June 2016 (2016-06-20) See paragraphs [0012]-[0047].	1-15
A	KR 10-2007-0002438 A (LG ELECTRONICS INC.) 05 January 2007 (2007-01-05) See paragraphs [0002]-[0021].	1-15
A	KR 10-2020-0105026 A (SAMSUNG ELECTRONICS CO., LTD.) 07 September 2020 (2020-09-07) See paragraphs [0009]-[0015].	1-15
A	JP 2019-148361 A (KIHARA SEISAKUSHO CO., LTD.) 05 September 2019 (2019-09-05) See paragraphs [0011]-[0017].	1-15

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
02 November 2022	**02 November 2022**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/010532

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2017-119217 A	06 July 2017	JP 6339261 B2	06 June 2018
JP 2016-107063 A	20 June 2016	CN 107208348 A	26 September 2017
		CN 107208348 B	14 April 2020
		KR 10-2016-0065225 A	08 June 2016
		US 10876249 B2	29 December 2020
		US 2018-0282934 A1	04 October 2018
		WO 2016-085252 A1	02 June 2016
KR 10-2007-0002438 A	05 January 2007	KR 10-1137333 B1	19 April 2012
KR 10-2020-0105026 A	07 September 2020	None	
JP 2019-148361 A	05 September 2019	None	

Form PCT/ISA/210 (patent family annex) (July 2022)