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(54) METHOD FOR CONTROLLING CLEANING DEVICE, ELECTRONIC DEVICE AND STORAGE MEDIUM

(57) The present disclosure provides a method and apparatus for controlling a cleaning device (100), an electronic device (400) and a storage medium (4201, 4202, 4203), and relates to the technical field of cleaning devices. The cleaning device (100) includes a clothes processing device (110) and a cleaning robot (120) provided under the clothes processing device (110), and the cleaning robot (120) is capable of moving out from under the clothes processing device. The method includes: obtaining (S201) position information of the cleaning robot (120); and controlling (S202) a rotating speed of a drum (111) in the clothes processing device (110) according to the position information of the cleaning robot (120).

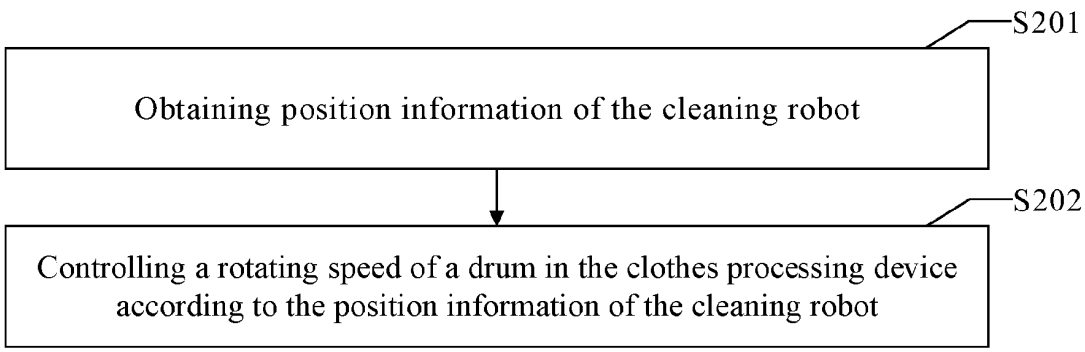

Fig. 2

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to the technical field of cleaning devices, and in particular to a method and apparatus for controlling a cleaning device, an electronic device and a storage medium.

BACKGROUND

[0002] With the development of cleaning devices, a "double-washing station" which integrates a clothes processing device and a cleaning robot has gradually attracted more attention. By integrating the cleaning robot under the traditional clothes processing device, the double-washing station can reduce the space occupied by the cleaning device to some extent.

SUMMARY

[0003] In order to overcome the problems existing in related prior art, the present disclosure provides a method for controlling a cleaning device, an electronic device and a storage medium.

[0004] According to a first aspect of the present disclosure, there is provided a method for controlling a cleaning device, where the cleaning device includes a clothes processing device and a cleaning robot provided under the clothes processing device, and the cleaning robot is capable of moving out from under the clothes processing device;

the method includes:
obtaining position information of the cleaning robot; and
controlling a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

[0005] Optionally, controlling the rotating speed of the drum in the clothes processing device according to the position information of the cleaning robot includes:

controlling the drum to operate at a first rotating speed in a case that the cleaning robot is located under the clothes processing device;
controlling the drum to operate at a second rotating speed in a case that the cleaning robot has moved out from under the clothes processing device, where the first rotating speed is less than the second rotating speed.

[0006] Optionally, controlling the drum to operate at the first rotating speed includes:
controlling the drum to operate at the first rotating speed in a case of detecting that the cleaning robot is in a charging state.

[0007] Optionally, controlling the rotating speed of the drum in the clothes processing device according to the position information of the cleaning robot includes:
in a case that the cleaning robot has moved out from under the clothes processing device, controlling the drum to operate at a first rotating speed in response to the cleaning robot returning to be under the clothes processing device.

[0008] Optionally, controlling the drum to operate at the first rotating speed in response to the cleaning robot returning to be under the clothes processing device includes:

obtaining an expected return time of the cleaning robot in response to the cleaning robot returning to be under the clothes processing device;
controlling the drum to operate at the first rotating speed in response to a time interval between the current time and the expected return time being less than a preset time interval.

[0009] Optionally, the method further includes:
in a case that the cleaning robot has moved out from under the clothes processing device, keeping the cleaning robot in a state of moving out until the drum stops operating.

[0010] Optionally, the method further includes:
prolonging an operating time of the drum in a case of detecting that the drum operates at the first rotating speed.

[0011] According to a second aspect of the present disclosure, there is provided an apparatus for controlling a cleaning device, where the cleaning device includes a clothes processing device and a cleaning robot provided under the clothes processing device, and the cleaning robot is capable of moving out from under the clothes processing device;
the apparatus includes:

an obtaining module, configured to obtain position information of the cleaning robot; and
a control module, configured to control a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

[0012] According to a third aspect of the present disclosure, there is provided an electronic device, including: a processor; and a memory for storing instructions executable by the processor, where the processor is configured to execute the method according to the first aspect of examples of the present disclosure by executing the executable instructions.

[0013] According to a fourth aspect of the present disclosure, there is provided a non-transitory computer-readable storage medium, storing a computer program which, when executed by a processor, causes the processor to implement the method according to the first

aspect of examples of the present disclosure.

[0014] The method for controlling the cleaning device provided by the present disclosure may obtain position information of the cleaning robot and control a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot, so as to alleviate the vibration of the whole cleaning device resulted from the excessively high rotating speed of the drum, thus avoiding the abnormality of the cleaning robot in the charging process.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a schematic structural diagram of a cleaning device according to an example of the present disclosure.

Fig. 2 is a schematic flow diagram of a method for controlling a cleaning device according to an example of the present disclosure.

Fig. 3 is a schematic structural diagram of an apparatus for controlling a cleaning device according to an example of the present disclosure.

Fig. 4 is a schematic structural diagram of an electronic device according to an example of the present disclosure.

DETAILED DESCRIPTION

[0016] The illustrative examples of the present disclosure will be described in detail, and examples of the illustrative examples are illustrated in the drawings. When the following description involves the drawings, unless otherwise indicated, the same numerals in different drawings represent the same or similar elements. The examples described in the following illustrative examples do not represent all examples consistent with the present disclosure. Rather, the examples are examples of apparatuses and methods consistent with some aspects of the present disclosure as detailed in the appended claims.

[0017] The terms used in the present disclosure are for the purpose of describing specific examples and are not intended to limit the present disclosure. The singular forms "a", "an" and "the" used in the present disclosure and the appended claims are also intended to include the plural forms, unless the context clearly indicates otherwise. It is to be also understood that the term "and/or" as used refers to and encompasses any or all possible combinations of one or more of the associated listed items.

[0018] It is to be understood that although the terms first, second, third, and the like may be used to describe various information in the present disclosure, the information is not limited to these terms. These terms are used to distinguish the same type of information from each other. For example, without departing from the scope of the present disclosure, first information may also be referred to as second information, and similarly, second information may also be referred to as first information. Depending on the context, the word "if' as used may be interpreted as "at the time when" or "when" or "in response to determining".

[0019] In related art, since the double-washing station integrates the cleaning robot under the clothes processing device, and the drum of the double-washing station will rotate at a high speed during the operation of the clothes processing device (for example, when a dehydration instruction is executed), the whole double-washing station vibrates violently. Such vibration will lead to poor contact of the cleaning robot in the charging process, and even cause a damage to a charging module.

[0020] First, the application scenario for the examples of the present disclosure will be introduced.

[0021] Referring to Fig. 1, Fig. 1 is a schematic structural diagram of a cleaning device according to an example of the present disclosure. As shown in Fig. 1, the cleaning device 100 includes a clothes processing device 110 and a cleaning robot 120 provided under the clothes processing device 110.

[0022] A rotatable drum 111 is provided in the clothes processing device 110. The clothes processing device 110 may realize a washing function or a dehydration function by controlling the rotation of the drum 111. The clothes processing device 110 may be further provided with other functions such as a drying function and a clothes disinfection function, and the start of these functions may also result in the rotation of the drum 111, which is not limited in the examples of the present disclosure.

[0023] The cleaning robot 120 may be provided under the drum 111, and may freely move out from under the drum 111 or return to be under the drum 111. For example, the cleaning robot 120 may be a cleaning robot capable of moving freely, such as a sweeping robot, a mopping robot or a sweeping and mopping robot, which is not limited in the examples of the present disclosure.

[0024] In some examples, the cleaning robot 120 may share the same set of water supply and drainage pipes with the clothes processing device 110, and the charging module, dust collecting module and other modules suitable for the cleaning robot may all be integrated inside the clothes processing device 110, thus saving the space occupied by the cleaning robot 120.

[0025] Since the charging module, the dust collecting module and the water supply and drainage pipes of the cleaning robot may all be integrated inside the clothes processing device 110, the vibration generated by the high-speed rotation of the drum 111 will drive the above components to vibrate together, which will lead to failures such as poor contact in the charging process of the cleaning robot, and even lead to dust leakage in the dust collecting process of the cleaning robot or sewage leakage in the water supply and drainage processes.

[0026] In view of this, the solution provided by the examples of the present disclosure may obtain position information of the cleaning robot and control a rotating

speed of a drum in the clothes processing device according to the position information of the cleaning robot, so as to alleviate the vibration of the whole cleaning device resulted from the excessively high rotating speed of the drum, thus avoiding the above failures.

[0027] Next, the illustrative examples of the present disclosure will be described in detail in combination with the above application scenario.

[0028] First, an example of the present disclosure provides a method for controlling a cleaning device. The method may be executed by any electronic device. The cleaning device may be a "double-washing station" including a clothes processing device and a cleaning robot, where the cleaning robot is provided under the clothes processing device.

[0029] Fig. 2 is a schematic flow diagram of a method for controlling a cleaning device according to an example of the present disclosure. As shown in Fig. 2, the method for controlling the cleaning device according to the example of the present disclosure includes steps S201 and S202.

[0030] Step S201 includes obtaining position information of the cleaning robot.

[0031] It is to be noted that the position information of the cleaning robot may be obtained by a position sensor installed on the cleaning robot or by calculating a moving trajectory in a manner of combining a moving distance of the cleaning robot with a steering data. Since the example of the present disclosure focuses on whether the cleaning robot is located under the clothes processing device, whether the cleaning robot is located under the clothes processing device may be determined by installing a corresponding object detection sensor under the clothes processing device.

[0032] In some examples, the position information of the cleaning robot may be obtained before the start instruction for the clothes processing device is executed, or may be obtained in real time during the execution of the start instruction. The start instruction may be a washing instruction, a dehydration instruction, or a drying instruction, etc., which is not limited in the examples of the present disclosure.

[0033] For example, when the clothes processing device is executing the dehydration instruction, the rotating speed of the drum is evidently higher than the rotating speed of the drum in the execution of other instructions. For example, when the clothes processing device is executing the dehydration instruction, the rotating speed of the drum may reach 1200 rpm or more, but when the washing instruction is executed, the rotating speed of the drum may merely be 80 rpm or even less. Since a high rotating speed causes the drum to vibrate violently at a high frequency, after the dehydration instruction for the clothes processing device is received, the position information of the cleaning robot may be obtained before the dehydration instruction is executed, and the rotating speed of the drum may be controlled correspondingly, so as to avoid adverse effects of the violent high-frequency vibration on the cleaning robot.

[0034] Step S202 includes controlling a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

[0035] In some examples, in a case that the cleaning robot is located under the clothes processing device, the drum may be controlled to operate at a first rotating speed. In a case that the cleaning robot has moved out from under the clothes processing device, the drum may be controlled to operate at a second rotating speed. The first rotating speed may be understood as the rotating speed at which the induced vibration will not have adverse effects on the cleaning robot, and the second rotating speed may be understood as the rotating speed at which the clothes processing device operates normally. The first rotating speed is less than the second rotating speed.

[0036] That is to say, in a case that the cleaning robot is located under the clothes processing device, the frequency and amplitude of vibration generated during the rotation of the drum may be controlled within a safe range that will not affect the cleaning robot by reducing the rotating speed of the drum in the clothes processing device.

[0037] It may be understood that the second rotating speed may be different when the clothes processing device executes different instructions. In a case that the second rotating speed is less than the first rotating speed, the rotating speed of the drum does not need to be controlled or adjusted. For example, the rotating speed of the drum that may ensure the safety of the cleaning robot is 800 rpm, and the rotating speed of the drum is 100 rpm during the clothes processing device executes the washing instruction. In this case, even if the cleaning robot is located under the clothes processing device, the rotating speed of the drum does not need to be controlled.

[0038] In some examples, whether the cleaning robot is in a charging state may be detected in a case that the cleaning robot is located under the clothes processing device. In a case of detecting that the cleaning robot is in the charging state, the drum is then controlled to operate at a first rotating speed, so as to avoid the adverse effects resulted from the excessively high rotating speed of the drum on the cleaning robot in the charging process. Since the cleaning robot may be kept under the clothes processing device for a long time, in a case that the cleaning robot is in a non-charging state, the rotating speed of the drum is not reduced, which may effectively improve the clothes processing efficiency of the clothes processing device and will not result in adverse effects on the cleaning robot.

[0039] It may be understood that the time when the cleaning robot is in a charging state usually comes after completing a cleaning task and returning to be under the clothes processing device. In this case, the cleaning robot is first interfaced with the charging module integrated in the clothes processing device to enter the charging state, and then collects dust or washes the

mopping module through the water supply and drainage pipes according to the execution of the cleaning task. That is to say, no matter which processing the cleaning robot needs to carry out after returning to be under the clothes processing device, charging the cleaning robot usually takes precedence. Therefore, by taking the fact that the cleaning robot is in the charging state as the condition of determining whether the drum operates at the first rotating speed, various possible interactions between the cleaning robot and the clothes processing device may be actually covered, so as to avoid the adverse effects of violent vibration on various interactions, such as poor contact in the charging process and dust leakage in the dust collecting process.

[0040] In some examples, in a case that the cleaning robot has moved out from under the clothes processing device, the drum is controlled to operate at the first rotating speed in response to the cleaning robot returning to be under the clothes processing device.

[0041] It is to be noted that "the cleaning robot has moved out from under the clothes processing device" described in the examples of the present disclosure does not limit the manner in which the cleaning robot moves out from under the clothes processing device. For example, the cleaning robot may move out from under the clothes processing device due to the need to execute a cleaning task, or may move out from under the clothes processing device in a manner of being actively controlled by a user. The cleaning robot which has moved out may be in a stationary standby state or a moving state. For example, the cleaning robot which has moved out may keep stationary at a position preset by the user that does not affect the user's daily life. Alternatively, the cleaning robot may be caused to execute a cleaning task, that is, moving according to a planned cleaning route in the space where the cleaning device is located, which is not limited in the examples of the present disclosure.

[0042] Since the cleaning robot which has moved out will immediately enter the charging state after the cleaning robot returns to be under the clothes processing device, the rotating speed of the drum in the clothes processing device is reduced in a case that the cleaning robot returns to be under the clothes processing device, so as to prevent adverse effects of the rotation of the drum at a high rotating speed on the cleaning robot in the charging process. For example, after the cleaning robot returns to be under the clothes processing device, the drum is still rotating at a high speed so as to result in violent vibration, which may prevent the cleaning robot from returning to an accurate position, or prevent the charging interface on the cleaning robot from being interfaced with the charging module provided inside the clothing processing device, and may also prevent the dust collecting interface or the water supply and drainage interfaces on the cleaning robot from being interfaced with corresponding modules.

[0043] For example, expected return time of the cleaning robot may be obtained when the cleaning robot returns to be under the clothes processing device. The drum is controlled to operate at the first rotating speed in a case that a time interval between a current time and the expected return time is less than a preset time interval. The preset time interval may be set according to a current rotating speed of the drum. For example, since the cleaning robot is not under the clothes processing device, the drum is currently operating at a second rotating speed of 1200 rpm, but the first rotating speed that ensure the safety of the cleaning robot is 800 rpm. In order to enable the rotating speed of the drum smoothly reduce from 1200 rpm to 800 rpm when the cleaning robot returns, and to prevent damage to the drum due to sudden change in the rotating speed, 10 seconds may be needed to reduce the rotating speed from 1200 rpm to 800 rpm. In this case, the preset time interval may be 10 seconds, which may be understood as 10 seconds reserved, so as to enable the rotating speed of the drum safely reduced to a safe rotating speed that will not affect the cleaning robot.

[0044] That is to say, a certain time may be reserved for reducing the rotating speed of the drum, so as to ensure enough time for the rotating speed of the drum to be reduced from the second rotating speed to the first rotating speed, while avoiding damage to the drum due to the rapid reduction in the rotating speed of the drum.

[0045] It may be understood that in a case that the expected return time of the cleaning robot is after the expected operation completion time of the clothes processing device, the rotating speed of the drum may not be controlled, that is, the rotating process of the drum will not cause any effect on the cleaning robot.

[0046] In this way, the drum may maintain a high clothing processing efficiency for a long time without affecting the cleaning robot, thus balancing the safety of the cleaning robot with the requirement for the rotating speed of clothing processing.

[0047] In some examples, in a case that the cleaning robot has moved out from under the clothes processing device, the cleaning robot may be kept in a state of moving out until the drum stops operating, thus giving priority to ensuring the clothes processing efficiency in the drum.

[0048] In some examples, the operating time of the drum may be prolonged in a case of detecting that the drum operates at the first rotating speed, so as to ensure the clothes processing effect. For example, the relationship between the first rotating speed and the prolonged operating time of the drum may be calibrated through experiments, which is not described in detail in the examples of the present disclosure.

[0049] Therefore, the solution provided by the examples of the present disclosure may, by controlling the rotating speed of the drum in the clothes processing device, alleviate the vibration of the whole cleaning device resulted from the excessively high rotating speed of the drum, so as to enable the cleaning robot to normally interact with various modules provided in the clothes

processing device, ensuring that the cleaning robot may be normally charged in the rotating process of the drum, or carry out interactive operations such as dust collection or water supply and drainage.

[0050] Based on the same inventive concept, the examples of the present disclosure further provide an apparatus for controlling a cleaning device, as described in the following examples. Since the problem solving principle in the apparatus example is similar to that in the above method example, the implementation of the apparatus example may refer to the implementation of the above method example, so the same aspects will not be described in detail.

[0051] Fig. 3 is a schematic structural diagram of an apparatus for controlling a cleaning device according to an example of the present disclosure. The cleaning device may include a clothes processing device and a cleaning robot provided under the clothes processing device, and the cleaning robot is capable of moving out from under the clothes processing device. As shown in Fig. 3, the apparatus 300 for controlling the cleaning device includes an obtaining module 301 and a control module 302.

[0052] The obtaining module 301 is configured to obtain position information of the cleaning robot.

[0053] The control module 302 is configured to control a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

[0054] In some examples, the control module 302 is configured to: control the drum to operate at a first rotating speed in a case that the cleaning robot is located under the clothes processing device; and control the drum to operate at a second rotating speed in a case that the cleaning robot has moved out from under the clothes processing device, where the first rotating speed is less than the second rotating speed.

[0055] In some examples, the control module 302 is configured to control the drum to operate at the first rotating speed in a case of detecting that the cleaning robot is in a charging state.

[0056] In some examples, the control module 302 is configured to, in a case that the cleaning robot has moved out from under the clothes processing device, control the drum to operate at a first rotating speed in response to the cleaning robot returning to be under the clothes processing device.

[0057] In some examples, the control module 302 is configured to: obtain expected return time of the cleaning robot in response to the cleaning robot returning to be under the clothes processing device; and control the drum to operate at a first rotating speed in a case that a time interval between the current time and the expected return time is less than a preset time interval.

[0058] In some examples, the control module 302 is further configured to keep, in a case that the cleaning robot has moved out from under the clothes processing device, the cleaning robot in a state of moving out until the drum stops operating.

[0059] In some examples, the control module 302 is further configured to prolong a operating time of the drum in a case of detecting that the drum operates at the first rotating speed.

[0060] It is to be noted that in a case that the apparatus for controlling the cleaning device provided by the above examples is configured to control the cleaning device, the apparatus for controlling the cleaning device is illustrated by giving examples for the division of the above function modules. In practical applications, the above function allocation may be completed by different function modules as needed, that is, the internal structure of the apparatus is divided into different function modules to complete all or part of the functions described above. In addition, the apparatus for controlling the cleaning device provided by the above examples belongs to the same concept as the method for controlling the cleaning device described in the examples of the present disclosure, and the implementation process is detailed in the method examples, which will not be described in detail here.

[0061] Those skilled in the art may understand that various aspects of the present disclosure may be implemented as a system, a method or a program product. Therefore, various aspects of the present disclosure may be implemented in the following forms: an entirely hardware implementation, an entirely software implementation (including firmware, microcode, etc.), or an implementation combining hardware and software aspects that may be collectively referred to as a "circuit", "module" or "system".

[0062] An electronic device 400 capable of implementing the examples of the present disclosure will be described with reference to Fig. 4. The electronic device 400 shown in Fig. 4 is an example, which will not bring any limitation to the functions and the application scopes of the examples of the present disclosure.

[0063] As shown in Fig. 4, the electronic device 400 is represented in the form of a general-purpose computing device. Components of the electronic device 400 may include, but are not limited to, at least one processing unit 410, at least one storage unit 420, and a bus 430 connecting different system components (including the storage unit 420 and the processing unit 410).

[0064] A program code is stored in the storage unit, and the program code may be executed by the processing unit 410, so that the processing unit 410 executes the steps according to various illustrative examples of the present disclosure described in the above section of "the illustrative method".

[0065] In some examples, the processing unit 410 may execute the following steps of the above method example: obtaining position information of the cleaning robot; and controlling a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

[0066] The storage unit 420 may include a readable medium in the form of a volatile storage unit, such as a

Random Access Memory (RAM) 4201 and/or a cache memory 4202, and may further include a Read-Only Memory (ROM) 4203.

[0067] The storage unit 420 may further include a program/utility 4204 with a set of (at least one) program modules 4205. Such program modules 4205 include, but are not limited to, an operating system, one or more application programs, other program modules and program data. Each or a certain combination of these examples may include the implementation of a network environment.

[0068] The bus 430 may represent one or more of several bus structures, including a storage unit bus or a storage unit controller, a peripheral bus, a graphic acceleration port, a processing unit, or a local bus using any of a plurality of bus structures.

[0069] The electronic device 400 may also communicate with one or more external devices 440 (e.g., a keyboard, a pointing device, a Bluetooth device), and may also communicate with one or more devices that enable the user to interact with the electronic device 400, and/or communicate with any device (e.g., a router, a modem) that enables the electronic device 400 to communicate with one or more other computing devices. Such communication may be carried out via an input/output (I/O) interface 450. Moreover, the electronic device 400 may also communicate with one or more networks (such as a Local Area Network (LAN), a Wide Area Network (WAN) and/or a public network, such as the Internet) via a network adapter 460. As shown in Fig. 4, the network adapter 460 communicates with other modules of the electronic device 400 via the bus 430. It is to be understood that although not shown in the figure, other hardware and/or software modules may be used in conjunction with the electronic device 400, including but not limited to: a microcode, a device driver, a redundant processing unit, an external disk drive array, a RAID system, a tape driver, a data backup storage systems, etc.

[0070] Through the description of the above examples, those skilled in the art will readily understand that the illustrative examples described may be implemented by software or by software in combination with indispensable hardware. Therefore, the technical solutions according to the examples of the present disclosure may be embodied in the form of a software product. The software product may be stored in a non-volatile storage medium (which may be a CD-ROM, a USB flash drive, a mobile hard disk, etc.) or on the network, and includes several instructions to enable a computing device (which may be a personal computer, a server, a terminal device, or a network device, etc.) to execute the method according to the examples of the present disclosure.

[0071] In the illustrative examples of the present disclosure, there is further provided a non-transitory computer-readable storage medium. The non-transitory computer-readable storage medium may be a readable signal medium or a readable storage medium, on which a program product capable of implementing the above method of the present disclosure is stored. In some possible examples, various aspects of the present disclosure may also be implemented in the form of a program product, which includes a program code. The program code is used to cause the terminal device to execute the steps according to various illustrative examples of the present disclosure described in the above section of "the illustrative method" when the program product operates on the terminal device.

[0072] More examples of the non-transitory computer-readable storage medium in the present disclosure may include, but are not limited to: electrical connection with one or more wires, a portable computer disk, a hard disk, a Random Access Memory (RAM), a Read-Only Memory (ROM), an Erasable Programmable Read-Only Memory (EPROM or a flash memory), an optical fiber, a portable Compact Disk Read-Only Memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the above.

[0073] In the present disclosure, the non-transitory computer-readable storage medium may include a data signal propagating in a baseband or as part of a carrier wave, in which a readable program code is carried. Such propagated data signal may take many forms, including but not limited to electromagnetic signals, optical signals or any suitable combination of the above. The readable signal medium may also be any readable medium other than the readable storage medium. The readable medium may send, propagate or transmit a program used by or in combination with an instruction execution system, apparatus or device.

[0074] Alternatively, the program code contained in the non-transitory computer-readable storage medium may be transmitted via any suitable medium, including but not limited to a wireless medium, a wired medium, an optical cable, RF and the like, or any suitable combination of the above.

[0075] In particular implementations, the program code for carrying out the operations of the present disclosure may be written in any combination of one or more programming languages, including object-oriented programming languages such as Java, C++ or the like, and conventional procedural programming languages such as the "C" programming language or similar programming languages. The program code may be executed entirely on the user computing device, partly on the user equipment, as a stand-alone software package, partly on the user computing device and partly on the remote computing device, or entirely on the remote computing device or server. In the case involving the remote computing device, the remote computing device may be connected to the user computing device via any type of network, including a Local Area Network (LAN) or a Wide Area Network (WAN), or may be connected to an external computing device (for example, connected via the Internet using an Internet service provider).

[0076] It is to be noted that although several modules or units of the device for executing actions are mentioned in

the above detailed description, such division is not mandatory. In fact, according to the examples of the present disclosure, the features and functions of two or more modules or units described above may be embodied in one module or unit. On the contrary, the features and functions of one module or unit described above may be further divided to be embodied by a plurality of modules or units.

[0077] In addition, although various steps of the method in the present disclosure are described in a specific order in the drawings, it does not require or imply that these steps have to be executed in the specific order, or that all the illustrated steps have to be executed to achieve the desired results. Additionally or alternatively, some steps may be omitted, a plurality of steps may be combined into one step for execution, and/or one step may be decomposed into a plurality of steps for execution, and the like.

[0078] Through the description of the above examples, those skilled in the art will readily understand that the illustrative examples described may be implemented by software or by software in combination with indispensable hardware. Therefore, the technical solutions according to the examples of the present disclosure may be embodied in the form of a software product. The software product may be stored in a non-volatile storage medium (which may be a CD-ROM, a USB flash drive, a mobile hard disk, etc.) or on the network, and includes several instructions to enable a computing device (which may be a personal computer, a server, a mobile terminal, or a network device, etc.) to execute the method according to the examples of the present disclosure.

[0079] Those skilled in the art will readily envisage other examples of the present disclosure after considering the specification and practicing the present disclosure. The present disclosure is intended to cover any variations, uses, or adaptations of the present disclosure, which follow the general principle of the present disclosure and include common general knowledge or customary means in the technical field that are not disclosed in the present disclosure.

Claims

1. A method for controlling a cleaning device, wherein the cleaning device comprises a clothes processing device and a cleaning robot provided under the clothes processing device, and the cleaning robot is capable of moving out from under the clothes processing device;
   the method comprises:

   obtaining (S201) position information of the cleaning robot; and
   controlling (S202) a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

2. The method according to claim 1, wherein controlling (S202) the rotating speed of the drum in the clothes processing device according to the position information of the cleaning robot comprises:

   controlling the drum to operate at a first rotating speed in a case that the cleaning robot is located under the clothes processing device;
   controlling the drum to operate at a second rotating speed in a case that the cleaning robot has moved out from under the clothes processing device, wherein the first rotating speed is less than the second rotating speed.

3. The method according to claim 2, wherein controlling the drum to operate at the first rotating speed comprises:
   controlling the drum to operate at the first rotating speed in a case of detecting that the cleaning robot is in a charging state.

4. The method according to any one of claims 1 to 3, wherein controlling (S202) the rotating speed of the drum in the clothes processing device according to the position information of the cleaning robot comprises:
   in a case that the cleaning robot has moved out from under the clothes processing device, controlling the drum to operate at a first rotating speed in response to the cleaning robot returning to be under the clothes processing device.

5. The method according to claim 4, wherein controlling the drum to operate at the first rotating speed in response to the cleaning robot returning to be under the clothes processing device comprises:

   obtaining an expected return time of the cleaning robot in response to the cleaning robot returning to be under the clothes processing device;
   controlling the drum to operate at the first rotating speed in a case of determining that a time interval between a current time and the expected return time is less than a preset time interval.

6. The method according to any one of claims 1 to 5, wherein the method further comprises:
   in a case that the cleaning robot has moved out from under the clothes processing device, keeping the cleaning robot in a state of moving out until the drum stops operating.

7. The method according to any of claims 2 to 5, wherein the method further comprises:
   prolonging an operating time of the drum in a case of detecting that the drum operates at the first rotating

speed.

8. An electronic device (400), comprising:

a processor (410); and
a memory (420) for storing instructions executable by the processor (410);
wherein the processor (410) is configured to execute the following method for controlling a cleaning device by executing the executable instructions, wherein the cleaning device comprises a clothes processing device and a cleaning robot provided under the clothes processing device, and the cleaning robot is capable of moving out from under the clothes processing device:

obtaining position information of the cleaning robot; and
controlling a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot.

9. The electronic device (400) according to claim 8, wherein the processor (410) is configured to:

control the drum to operate at a first rotating speed in a case that the cleaning robot is located under the clothes processing device;
control the drum to operate at a second rotating speed in a case that the cleaning robot has moved out from under the clothes processing device, wherein the first rotating speed is less than the second rotating speed.

10. The electronic device (400) according to claim 9, wherein the processor (410) is configured to:
control the drum to operate at the first rotating speed in a case of detecting that the cleaning robot is in a charging state.

11. The electronic device (400) according to claim 8, wherein the processor (410) is configured to:
in a case that the cleaning robot has moved out from under the clothes processing device, control the drum to operate at a first rotating speed in response to the cleaning robot returning to be under the clothes processing device.

12. The electronic device (400) according to claim 11, wherein the processor (410) is configured to:

obtain an expected return time of the cleaning robot in response to the cleaning robot returning to be under the clothes processing device;
control the drum to operate at the first rotating speed in a case of determining that a time interval between a current time and the expected return time is less than a preset time interval.

13. The electronic device (400) according to any one of claims 8 to 12, wherein the processor (410) is further configured to:
in a case that the cleaning robot has moved out from under the clothes processing device, keep the cleaning robot in a state of moving out until the drum stops operating.

14. The electronic device (400) according to any of claims 9 to 12, wherein the processor (410) is further configured to:
prolong an operating time of the drum in a case of detecting that the drum operates at the first rotating speed.

15. A non-transitory computer-readable storage medium, storing a computer program which, when executed by a processor, causes the processor to perform the method according to any of claims 1 to 7.

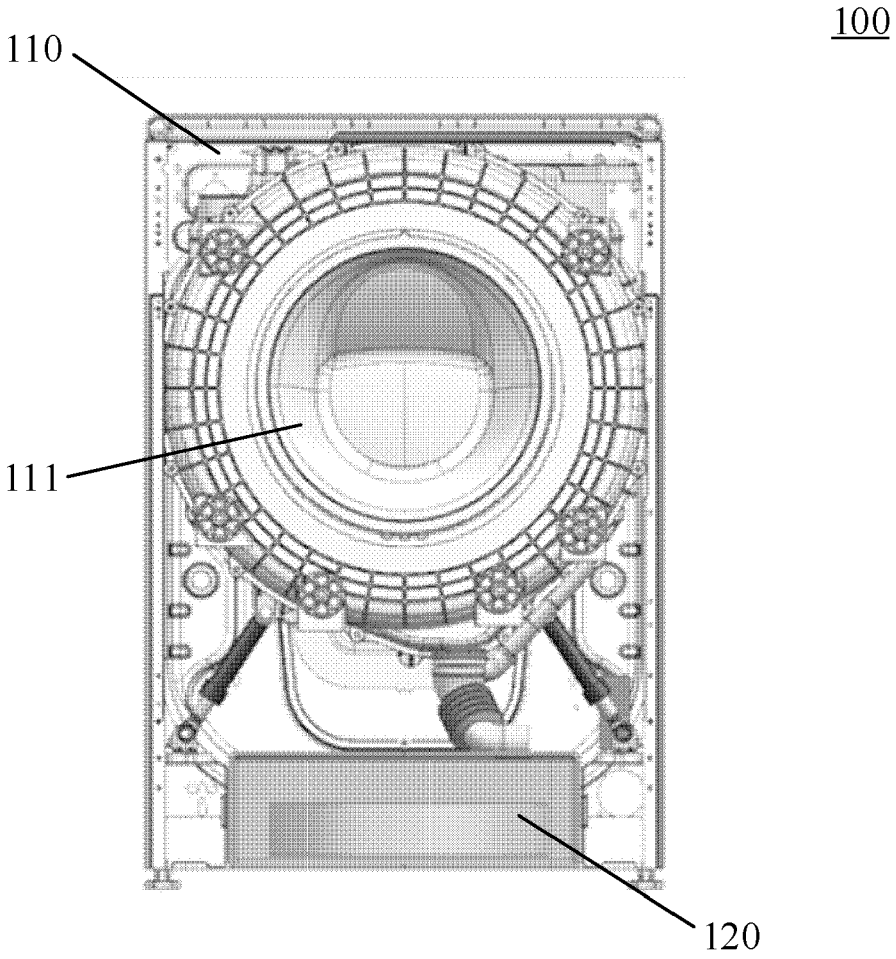
100
110
111
120

Fig. 1

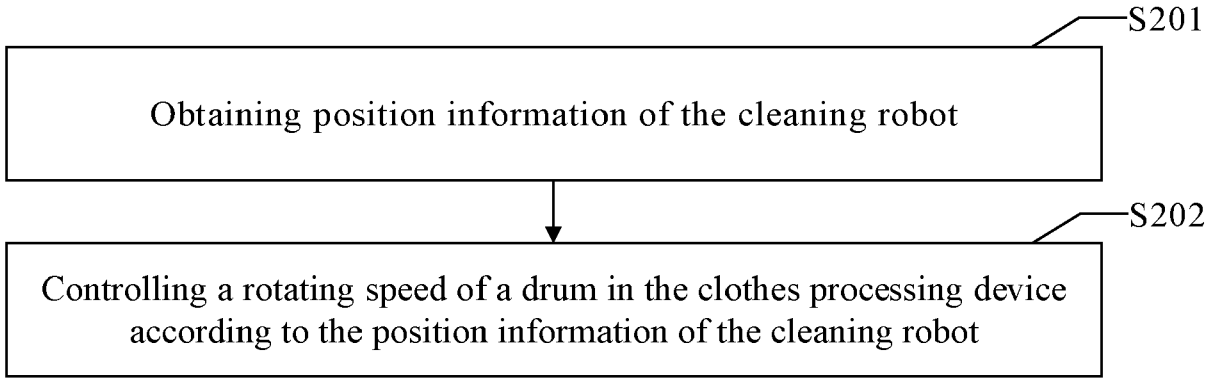
S201
Obtaining position information of the cleaning robot
S202
Controlling a rotating speed of a drum in the clothes processing device according to the position information of the cleaning robot

Fig. 2

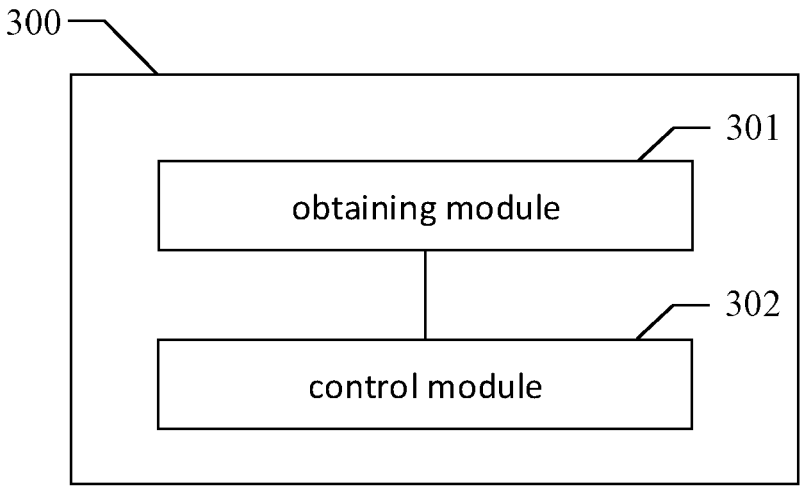
300
301
obtaining module
302
control module

Fig. 3

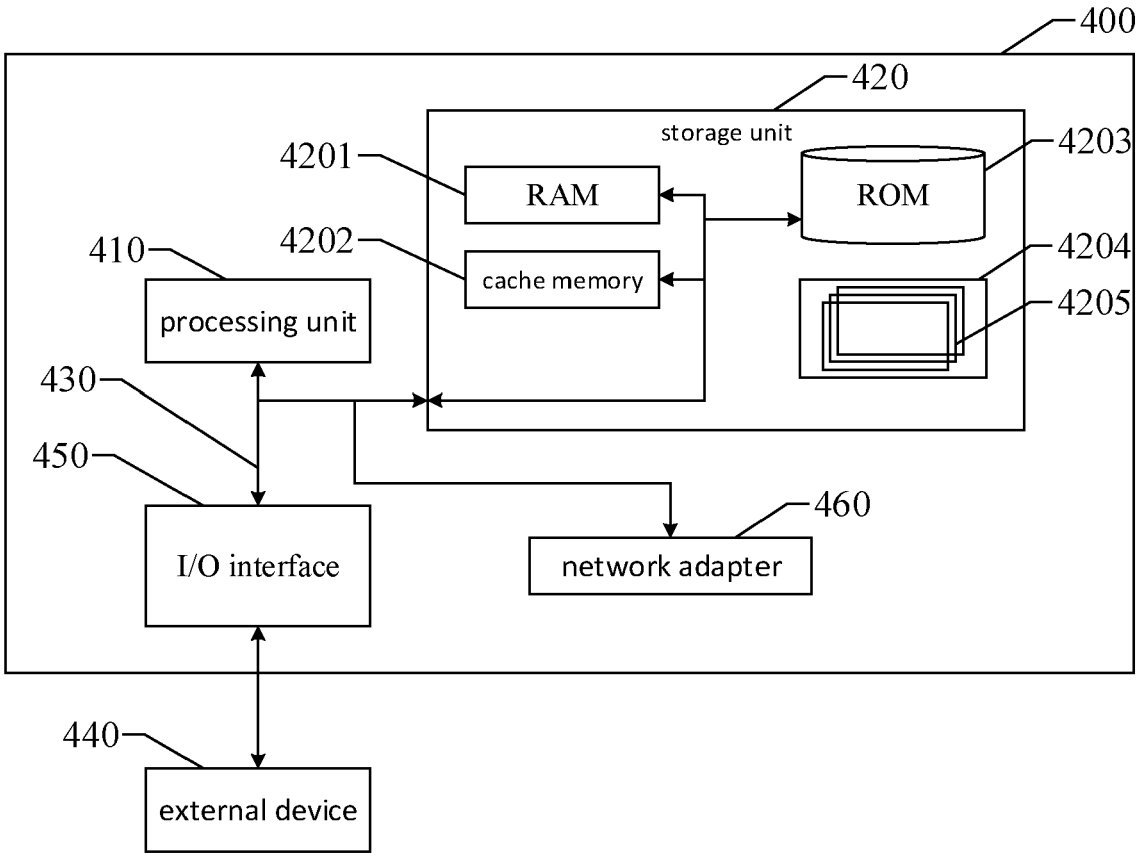
400
420
storage unit
4201
RAM
4203
ROM
4202
cache memory
4204
4205
410
processing unit
430
450
460
I/O interface
network adapter
440
external device

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 24 15 3682

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 116 509 271 A (WUXI FEILING ELECTRONIC CO LTD) 1 August 2023 (2023-08-01) * the whole document *	1-15	INV. D06F29/00 D06F33/30
X	CN 114 995 237 A (WUXI LITTLE SWAN ELECTRICAL APPLIANCE CO LTD) 2 September 2022 (2022-09-02) * abstract * * claims; figures *	1-15	ADD. D06F34/14 D06F103/00 D06F105/48 A47L11/10 A47L11/20
A	WO 2023/155677 A1 (QINGDAO HAIER WASHING MACH CO [CN]; HAIER SMART HOME CO LTD [CN]) 24 August 2023 (2023-08-24) * abstract * * page 13, last paragraph - page 14, last paragraph; figures *	1-15	A47L11/24 A47L11/28 A47L11/32 A47L11/40
A	CN 112 294 201 A (DENG AILI) 2 February 2021 (2021-02-02) * the whole document *	1-15	
A	CN 114 680 737 A (QINGDAO HAIER DRUM WASHING MACHINE LTD COMPANY ET AL.) 1 July 2022 (2022-07-01) * the whole document *	1-15	TECHNICAL FIELDS SEARCHED (IPC) D06F A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 June 2024	Prosig, Christina

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10-06-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 116509271 A	01-08-2023	NONE	
CN 114995237 A	02-09-2022	CN 114995237 A	02-09-2022
		CN 116560257 A	08-08-2023
		EP 4343466 A1	27-03-2024
		WO 2023231911 A1	07-12-2023
WO 2023155677 A1	24-08-2023	NONE	
CN 112294201 A	02-02-2021	NONE	
CN 114680737 A	01-07-2022	NONE	

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