METHOD, APPARATUS, STORAGE MEDIUM, AND ELECTRONIC DEVICE FOR CONTROLLING ROTATION OF SIDE BRUSH

[0001] The present disclosure claims priority of the following patent application: Chinese patent application, filed with the Chinese Patent Office on April 12, 2022, No. 202210379862.4, and entitled "METHOD, APPARATUS, STORAGE MEDIUM, AND ELECTRONIC DEVICE FOR CONTROLLING ROTATION OF SIDE BRUSH", the entire contents of which are incorporated by reference in the present disclosure.

TECHNICAL FIELD

[0002] Embodiments of the present disclosure relate to the field of communications, and in particular, to a method, an apparatus, a storage medium, and an electronic device for controlling rotation of a side brush.

BACKGROUND

[0003] With the development of technology, smart cleaning homes are becoming more and more popular and are gradually entering more and more households. In the field of smart cleaning apparatuses, a side brush is one of the core components. Taking a sweeping robot as an example, the side brush is mostly disposed at an edge of the sweeping robot, and its function is to sweep out the dust so that a vacuum cleaner at a bottom of the sweeping robot can suck up the dust.

[0004] In the prior art, the side brush maintains the same rotational speed during an entire cleaning task of the cleaning apparatus. If the rotational speed is too high, a relatively small obstacle would be knocked away, and if the rotational speed is too low, the cleaning would not be thorough, which results in a problem of low accuracy in controlling the rotational speed of the side brush by the cleaning apparatus.

[0005] With regard to the problem of low accuracy in controlling the rotational speed of the side brush by the cleaning apparatus in the related art, no effective solution has been put forward at present.

SUMMARY

[0006] Embodiments of the present disclosure provide method, apparatus, storage medium,

and electronic device for controlling rotation of a side brush to at least solve the problem of low accuracy in controlling the rotational speed of the side brush by a cleaning apparatus in the related art.

[0007] According to an embodiment of the present disclosure, the method for controlling the rotation of the side brush is provided. The method may include obtaining a working mode of a cleaning apparatus when the cleaning apparatus is working; determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and controlling the side brush of the cleaning apparatus to rotate at the target rotational speed.

[0008] In an exemplary embodiment, the determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned may include, in a case that the cleaning apparatus is in a first working mode, determining the target rotational speed of the side brush according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle may include the size information of the obstacle.

[0009] In an exemplary embodiment, in a case that the cleaning apparatus is in the first working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned may include, in a case that the size information of the obstacle is determined to be greater than or equal to a preset size threshold according to the size information, determining that the target rotational speed of the side brush may be a first rotational speed; or in a case that the size information of the obstacle is determined to be smaller than the preset size threshold according to the size information, determining that the target rotational speed of the side brush may be a second rotational speed, wherein the first rotational speed may be greater than the second rotational speed.

[0010] In an exemplary embodiment, in a case that the cleaning apparatus is in a second working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to the type information of the obstacle detected by the cleaning apparatus

in the area currently being cleaned may include, in a case that it is determined that the obstacle has a sharp corner according to the type information, determining that the target rotational speed of the side brush is a third rotational speed, wherein an angle of the sharp corner is smaller than or equal to a preset angle threshold; or in a case that it is determined that the obstacle does not have a sharp corner according to the type information, determining that the target rotational speed of the side brush is a fourth rotational speed, wherein the third rotational speed may be greater than the fourth rotational speed.

[0011] In an exemplary embodiment, in the case that the cleaning apparatus is in the first working mode, and no obstacle is detected by the cleaning apparatus, the method may further include determining that the target rotational speed of the side brush may be a first rotational speed.

[0012] In an exemplary embodiment, the first working mode may include arcuate route sweeping, and the second working mode may include sweeping along an edge.

[0013] According to another embodiment of the present disclosure, a control apparatus for controlling rotation of a side brush is provided. The control apparatus may include an obtaining module configured to obtain a working mode of a cleaning apparatus when the cleaning apparatus is working; a determining module configured to determine a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and a controlling module configured to control the side brush of the cleaning apparatus to rotate at the target rotational speed.

[0014] According to another embodiment of the present disclosure, a computer-readable storage medium is provided. The computer-readable storage medium may store a computer program, and when the computer program is executed by a processor, the steps of any of the above mentioned methods may be implemented.

[0015] According to another embodiment of the present disclosure, an electronic apparatus is further provided. The electronic apparatus may include a memory and a processor. A computer program may be stored in the memory, and the processor may be configured to run the computer program to perform the steps in any of the above-mentioned method embodiments.

[0016] Through the present disclosure, the target rotational speed of the side brush of the cleaning apparatus can be determined according to the working mode of the cleaning apparatus and the information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, and the side brush of the cleaning apparatus can be controlled to rotate at the currently determined target rotational speed. By controlling the side brush of the cleaning apparatus to rotate at different speeds under different working modes of the cleaning apparatus according to detected different obstacle information, the rotational speed of the side brush of the cleaning apparatus can be flexibly adjusted according to different conditions, thereby improving the cleaning effect of the cleaning apparatus, and solving the problem of low accuracy in controlling the rotational speed of the side brush by the cleaning apparatus, thus achieving the effect of improving the accuracy in controlling the rotational speed of the side brush by the cleaning apparatus.

BRIEF DESCRIPTION OF DRAWINGS

[0017] The accompanying drawings are described to provide a further understanding of the present disclosure and constitute a part of the present disclosure. The illustrative embodiments and the descriptions thereof in the present disclosure are used to explain the present disclosure and do not constitute an undue limitation of the present disclosure. In the drawings:

[0018] FIG. 1 is a block diagram illustrating a hardware structure of a mobile terminal of a method for controlling rotation of a side brush according to an embodiment of the present disclosure;

[0019] FIG. 2 is a flow chart illustrating a method for controlling rotation of a side brush according to an embodiment of the present disclosure; and

[0020] FIG. 3 is a structural block diagram illustrating an apparatus for controlling rotation of a side brush according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0021] The present disclosure is described in detail in the following with reference to the accompanying drawings and in combination with embodiments. It should be noted that, without conflict, embodiments in the present disclosure and features in embodiments can be

mutually combined.

[0022] It should be noted that, in the specification, claims, and the accompanying drawings of the present disclosure, the terms "first", "second", and the like are intended to distinguish similar objects but do not necessarily indicate a specific order or sequence.

[0023] A method embodiment provided in the embodiments of the present disclosure may be performed in a mobile robot or a similar computing apparatus. Taking a method embodiment performed in the mobile robot as an example, FIG. 1 is a block diagram illustrating a hardware structure of a method for controlling rotation of a side brush according to an embodiment of the present disclosure. As shown in FIG. 1, the mobile robot may include one or more (only one is shown in FIG. 1) processors 102 (the processor 102 may include but is not limited to a processing apparatus such as a microprocessor MCU or a programmable logic device FPGA, etc.), and a memory 104 for storing data. In an exemplary embodiment, the mobile robot may further include a transmission device 106 configured for a communication function and an input/output device 108. A person skilled in the art can understand that the structure shown in FIG. 1 is only illustrative and does not limit a structure of the mobile robot. For example, the mobile robot may further include more or fewer components than the mobile robot shown in FIG. 1 or have a different configuration with equivalent functions or more functions than the mobile robot shown in FIG. 1.

[0024] The memory 104 may be configured to store a computer program, for example, a software program and a module of an application software, such as a computer program corresponding to a control method for cleaning in an embodiment of the present disclosure. The processor 102 may perform various function applications and data processing, that is, it may implement the above-mentioned methods, by running the computer program stored in the memory 104. The memory 104 may include a high-speed random-access memory, and may further include a non-volatile memory, such as one or more magnetic storage apparatuses, a flash memory, or other non-volatile solid-state memories. In some embodiments, the memory 104 may further include a memory disposed remotely relative to the processor 102, and the remote memory may be connected to the mobile robot via a network. An example of the network may include but is not limited to the Internet, an intranet, a local area network, a mobile communication network, or a combination thereof.

[0025] The transmission device 106 may be configured to receive or send data via the network. A specific example of the network may include a wireless network provided by a communication provider of the mobile robot. In an embodiment, the transmission device 106 may include a Network Interface Controller (NIC), which may be connected to another network device through a base station to communicate with the Internet. In an embodiment, the transmission device 106 may be a radio frequency (RF) module, which may be configured to communicate with the Internet via a wireless manner.

[0026] Firstly, an application scenario of the present disclosure is described.

[0027] During working, a cleaning apparatus may perform a cleaning operation based on a pre-established area map. In different working modes, the cleaning apparatus may adopt the same rotational speed of the side brush for sweeping, which may knock away relatively small obstacles if the rotational speed is too high, and the cleaning may not be thorough if the rotational speed is too low, thereby resulting a problem of low accuracy in controlling the rotational speed of the side brush by the cleaning apparatus. With regard to the problem, a method for controlling rotation of the side brush is proposed in an embodiment of the present disclosure, thereby ensuring effective control of the rotational speed of the side brush by the cleaning apparatus and avoiding obstacles being knocked away or poor sweeping and cleaning. The cleaning apparatus involved in the embodiment of the present disclosure may be a sweeping robot or another device with cleaning and automatic driving capability.

[0028] The present disclosure will be described below in combination with embodiments.

[0029] In an embodiment, a method for controlling rotation of a side brush is provided, as shown in FIG. 2, the method includes the following steps:

[0030] Step S202, when a cleaning apparatus is working, obtaining a working mode of the cleaning apparatus.

[0031] The cleaning apparatus may be a sweeping robot apparatus, a vacuum cleaner device, or the like. The type of the cleaning apparatus is not limited herein. The working mode of the cleaning apparatus may be spiral sweeping, circular route sweeping, arcuate route sweeping, sweeping along an edge, etc. The working mode of the cleaning apparatus can be specifically determined according to a type of the cleaning apparatus and a working scenario, which is not limited.

[0032] Step S204, determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned.

[0033] The area currently being cleaned by the cleaning apparatus may be a closed cleaning space where the cleaning apparatus is located or a specific cleaning area determined by the cleaning apparatus according to a path planning map. The area being cleaned is not limited herein. The detected obstacle may be a wall, a table, or a chair in the area being cleaned, or a slipper, a paper box, etc. on the ground in the area being cleaned. The detected obstacle is not limited herein. The target rotational speed of the side brush of the cleaning apparatus may be determined according to the current working mode of the cleaning apparatus and the information of the obstacle.

[0034] Step S206, controlling the side brush of the cleaning apparatus to rotate at the target rotational speed.

[0035] The target rotational speed may be determined according to the current working mode of the cleaning apparatus and the information of the obstacle, and the side brush of the cleaning apparatus may be controlled to rotate at the target rotational speed.

[0036] An execution entity of the above-mentioned operations may be a cleaning apparatus (e.g., a smart robot, or another device with cleaning and automatic driving capability), a processor set in the cleaning apparatus, or a device with similar processing capability.

[0037] Optionally, in an exemplary embodiment, the execution entity of the above-mentioned steps may be a background processor, a device with similar processing capability, or a machine at least integrated with a data processing device, wherein the data processing device may comprise a terminal such as a computer or a mobile phone, which is not limited .

[0038] Through the above-mentioned steps, when the cleaning apparatus is working, the working mode of the cleaning apparatus may be obtained. The target rotational speed of the side brush of the cleaning apparatus may be determined according to the obtained working mode and the information of the obstacle detected by the cleaning apparatus in the current cleaning area, and the side brush may be controlled to rotate at the currently determined target rotational speed. By controlling the side brush of the cleaning apparatus to rotate at different speeds according to different working modes of the cleaning apparatus and detected

information of different obstacles, the cleaning apparatus can flexibly adjust the rotational speed of the side brush according to different conditions, thereby improving the cleaning effect of the cleaning apparatus, solving the problem of low accuracy in controlling the rotational speed of the side brush by the cleaning apparatus, and achieving the effect of improving the controlling accuracy of the rotational speed of the side brush by the cleaning apparatus.

[0039] Optionally, in an exemplary embodiment, the determining the target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of the obstacle detected by the cleaning apparatus in the area currently being cleaned may include: in a case that the cleaning apparatus is in a first working mode, determining the target rotational speed of the side brush according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle may include the size information of the obstacle; or in a case that the cleaning apparatus is in a second working mode, determining the target rotational speed of the side brush according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle may include the type information of the obstacle.

[0040] As an optional implementation, the working mode of the cleaning apparatus may include an arcuate route sweeping mode, a circular route sweeping mode, a spiral route sweeping mode, a sweeping along an edge mode. Assuming that the cleaning apparatus is a sweeping robot apparatus, the first working mode is the arcuate route sweeping mode, after the cleaning apparatus is turned on, positioning of the cleaning apparatus may be achieved according to a laser radar on the cleaning apparatus, and a sweeping map may be established. After the sweeping map is established, an area currently being cleaned by the sweeping robot may be determined, and the sweeping robot may be controlled to enter the first working mode, i.e., the arcuate route sweeping mode. At this time, the sweeping robot may start sweeping according to a preset arcuate route. During the sweeping process, the target rotational speed of the side brush may be determined according to the size information of the obstacle detected in the area currently being cleaned.

[0041] Assuming that the cleaning apparatus is the sweeping robot apparatus, the second

working mode is the sweeping along an edge mode, after the cleaning apparatus is turned on, positioning of the cleaning apparatus may be achieved according to the laser radar on the cleaning apparatus, and a sweeping map may be established. After the sweeping map is established, an area currently being cleaned by the sweeping robot may be determined, and the sweeping robot may be controlled to enter the first working mode. After the first working mode ends, the sweeping robot may be controlled to enter the second working mode, i.e., the sweeping along an edge mode. At this time, the sweeping robot may start sweeping according to a route along the edge in the sweeping map. During the sweeping process, the target rotational speed of the side brush may be determined according to the type of the obstacle detected in the area currently being cleaned.

[0042] Optionally, in an exemplary embodiment, in the case that the cleaning apparatus is in the first working mode, the determining the target rotational speed of the side brush according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned may include: in a case that the size information of the obstacle is determined to be greater than or equal to a preset size threshold according to the size information, determining that the target rotational speed of the side brush is a first rotational speed; or in a case that the size information of the obstacle is determined to be smaller than the preset size threshold according to the size information, determining that the target rotational speed of the side brush is a second rotational speed, wherein the first rotational speed may be greater than the second rotational speed.

[0043] As an optional implementation, assuming that the cleaning apparatus is the sweeping robot apparatus and the first working mode is the circular route sweeping mode, the rotational speed of the side brush may be further adjusted according to the size information of the obstacle detected in the area currently being cleaned. The preset size threshold may be 0.5 cm, 1 cm, or 1.4 cm, etc. The size of the preset size threshold is not limited herein. The preset size threshold may be determined according to the size of the side brush. Assuming that the preset size threshold is 1 cm and the first rotational speed is 100 r/min, when the cleaning apparatus detects an obstacle with a size greater than 1 cm in a moving direction, the current rotational speed of the side brush may not knock the obstacle away because the size of the obstacle is large enough. Therefore, the first rotational speed during normal movement may be used to

prioritize the cleaning strength of the side brush of the cleaning apparatus. At this time, the first rotational speed of 100 r/min may be regarded as the target rotational speed.

[0044] Assuming that the preset size threshold is 1 cm and the second rotational speed is 60 r/min, when the cleaning apparatus detects an obstacle with a size greater than or equal to 1cm in the moving direction, the current rotational speed of the side brush may knock the obstacle away because the size of the obstacle is relatively small. Therefore, the rotational speed of the side brush of the cleaning apparatus may be reduced, for example, it can be reduced to the second rotation speed of 60 r/min, thereby ensuring the cleaning strength of the side brush of the cleaning apparatus, and avoiding knocking the relatively small obstacles away by reducing the rotational speed of the side brush. At this time, the second rotational speed of 60 r/min may be regarded as the target rotational speed. Through the above manner, in the first working mode, the rotational speed of the side brush of the cleaning apparatus can be determined according to the size of the obstacle, which can improve the accuracy of controlling the rotational speed of the side brush, thereby improving the cleaning effect of the cleaning apparatus.

[0045] Optionally, in an exemplary embodiment, in a case that the cleaning apparatus is in a second working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned may include: in a case that it is determined that the obstacle has a sharp corner according to the type information, determining that the target rotational speed of the side brush is a third rotational speed, wherein the angle of the sharp corner may be smaller than or equal to a preset angle threshold; or in a case that it is determined that the obstacle does not have a sharp corner according to the type information, determining the target rotational speed of the side brush is a fourth rotational speed, wherein the third rotational speed may be greater than the fourth rotational speed.

[0046] As an optional implementation, assuming that the cleaning apparatus is a sweeping robot apparatus, the second working mode is the sweeping along an edge mode, the rotational speed of the side brush may be further adjusted according to the type information of the obstacle detected in the area currently being cleaned. Assuming that the type of the obstacle includes a wall side, a corner without a sharp corner, and a corner with a sharp corner, the

preset angle threshold may be 150°, 120°, or 100°. A value of the preset angle threshold is not limited herein, which may be determined according to a size of the side brush or a size of the cleaning apparatus. Assuming that the preset angle threshold is 120°, the sharp angle represents an angle less than or equal to the preset angle threshold of 120° and the third rotational speed is 200 r/min, when the cleaning apparatus is sweeping along the edge and the type of the obstacle detected is that there is no sharp corner, more dust and particulate objects may accumulate at this time because the cleaning position is at the wall side or a corner with a relatively large angle. Therefore, a relatively high rotational speed of the side brush may be required to improve the cleaning strength of the cleaning apparatus, and the third rotational speed of 200 r/min may be used. At this time, the third rotational speed of 200 r/min may be regarded as the target rotational speed.

[0047] Assuming that the fourth rotational speed is 300 r/min, in a case that the type of the obstacle detected by the cleaning apparatus is that there is a sharp corner, because the cleaning position belongs to a corner with a relatively small angle, it may be easy to accumulate more dust and the cleaning difficulty may become greater compared to the wall side and the corner with a relatively large angle. The rotational speed of the side brush of the cleaning apparatus may be further increased, for example, it may be increased to the fourth rotational speed of 300 r/min to further improve the cleaning strength of the cleaning apparatus. At this time, the second rotational speed of 300 r/min may be regarded as the target rotational speed. Through the above manner, in the second working mode, the rotational speed of the side brush of the cleaning apparatus may be determined according to whether the obstacle has a sharp corner, thereby further improving the accuracy of controlling the rotational speed of the side brush, thus improving the cleaning effect of the cleaning apparatus.

[0048] Optionally, in an exemplary embodiment, the method may further include in the case that the cleaning apparatus is in the first working mode, and it is determined that the cleaning apparatus has not detected the obstacle, determining the target rotational speed of the side brush is the first rotational speed.

[0049] As an optional implementation, assuming that the cleaning apparatus is the sweeping robot apparatus and the first working mode is the circular route sweeping mode, the rotational

speed of the side brush may be determined according to whether any obstacle is detected in the area currently being cleaned. Assuming that the first rotational speed is 100 r/min, when there is no obstacle is detected by the cleaning apparatus in the moving direction, the cleaning apparatus may be in a normal sweeping state at this time. Therefore, the first rotational speed during normal travel may be used to save power and reduce loss while ensuring the cleaning strength of the side brush of the cleaning apparatus. At this time, the first rotational speed of 100 r/min may be regarded as the target rotational speed.

[0050] Optionally, in an exemplary embodiment, the first working mode may include arcuate route sweeping, and the second working mode may include sweeping along an edge.

[0051] As an optional implementation, the first working mode may include the arcuate route sweeping, and may also be a cyclone type route sweeping, a circular route sweeping, etc. The first working mode is not limited herein and may be determined according to the cleaning mode specifically supported by the cleaning apparatus. The second working mode may include the sweeping along an edge. By controlling the rotational speed of the side brush of the cleaning apparatus in different working modes, the rotational speed of the side brush of the cleaning apparatus in different working scenarios can be adjusted, thereby achieving the effect of improving the accuracy of controlling the rotational speed of the side brush by the cleaning apparatus.

[0052] Based on the descriptions of the foregoing implementations, a person skilled in the art can clearly understand that the method(s) in the above-mentioned embodiments may be implemented by a software and an essential general hardware platform, or may be implemented by a hardware. On some occasions, the former may be a preferred implementation. Based on such understanding, the essential technical solution or the part of the present disclosure contributing to the prior art may be reflected in a form of a software product. The computer software product may be stored in a storage medium (e.g., a ROM, a RAM, a magnetic disk, or an optical disc), and may include a plurality of instructions for instructing a terminal device (which may be a mobile phone, a computer, a server, a network device, or the like) to perform the method(s) described in the embodiments of the present disclosure.

[0053] In an embodiment, a control apparatus for controlling rotation of a side brush is also

provided. The apparatus may be configured to implement the above-mentioned embodiments and the preferred implementation, and the described contents are not repeated herein. As used below, the term "module" may be a combination of a software and/or a hardware that can implement a predetermined function. Although the apparatus described in the following embodiments may be preferably implemented by a software, however, implementation performed by a hardware or a combination of a software and a hardware is also possible and contemplated.

[0054] FIG. 3 is a structural block diagram illustrating an apparatus for controlling rotation of a side brush according to an embodiment of the present disclosure. As shown in FIG. 3, the apparatus includes:

[0055] an obtaining module 32 configured to obtain a working mode of a cleaning apparatus when the cleaning apparatus is working;

[0056] a determining module 34 configured to determine a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and

[0057] a controlling module 36 configured to control the side brush of the cleaning apparatus to rotate at the target rotational speed.

[0058] In an optional embodiment, the above-mentioned determining module 34 may realize the determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned in the flowing manner: in a case that the cleaning apparatus is in a first working mode, determining the target rotational speed of the side brush according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle may include the size information of the obstacle; or in a case that the cleaning apparatus is in a second working mode, determining the target rotational speed of the side brush according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle may include the type information of the obstacle.

[0059] In an optional embodiment, the above-mentioned determining module 34 may realize, in a case that the cleaning apparatus is in a first working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned comprises: in a case that the size information of the obstacle is determined to be greater than or equal to a preset size threshold according to the size information, determining that the target rotational speed of the side brush may be a first rotational speed; or in a case that the size information of the obstacle is determined to be smaller than the preset size threshold according to the size information, determining that the target rotational speed of the side brush may be a second rotational speed, wherein the first rotational speed may be greater than the second rotational speed.

[0060] In an optional embodiment, the above-mentioned determining module 34 may realize, in a case that the cleaning apparatus is in a second working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned in the following manner: in a case that it is determined that the obstacle has a sharp corner according to the type information, determining the target rotational speed of the side brush may be a third rotational speed, wherein an angle of the sharp corner may be smaller than or equal to a preset angle threshold; or in a case that it is determined that the obstacle does not have a sharp corner according to the type information, determining the target rotational speed of the side brush may be a fourth rotational speed, wherein the third rotational speed may be greater than the fourth rotational speed.

[0061] In an optional embodiment, the above-mentioned apparatus may be also used to determine that the target rotational speed of the side brush is a first rotational speed in a case that the cleaning apparatus is in the first working mode, and no obstacle is detected by the cleaning apparatus.

[0062] In an optional embodiment, the first working mode may include arcuate route sweeping, and the second working mode may include sweeping along an edge.

[0063] In this embodiment, a cleaning apparatus is also provided, and the cleaning apparatus may include any of the above-mentioned apparatuses for controlling the rotation of

the side brush.

[0064] It should be noted that the above-mentioned modules may be implemented by a software or a hardware, and the latter may be implemented in the following manner, which is not limited thereto. All of the above-mentioned modules may be located in the same processor or may be located in different processors in any combination.

[0065] An embodiment of the present disclosure further provides a computer-readable storage medium. The computer-readable storage medium stores a computer program, and when the computer program is set to run, the steps in any of the above-mentioned method embodiments can be performed.

[0066] In an embodiment, the above-mentioned computer-readable storage medium may be configured to store a computer program for performing the following steps.

[0067] S1, obtaining a working mode of a cleaning apparatus when the cleaning apparatus is working;

[0068] S2, determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and

[0069] S3, controlling the side brush of the cleaning apparatus to rotate at the target rotational speed. In an exemplary embodiment, the computer-readable storage medium may include, but is not limited to a USB flash disk, a read-only memory (ROM), a random access memory (RAM), a mobile hard disk drive, a magnetic disk, an optical disk, or other medium that can store a computer program.

[0070] An embodiment of the present disclosure further provides an electronic apparatus including a memory and a processor. A computer program is stored in the memory, and the processor is configured to run the computer program, so that the steps in any of the above-mentioned method embodiments may be performed.

[0071] In an exemplary embodiment, the electronic apparatus may further include a transmission device and an input/output device, the transmission device may be connected to the above-mentioned processor, and the input/output device may be connected to the above-mentioned processor.

[0072] In an exemplary embodiment, the above-mentioned processor may be disposed to

perform the following steps through the computer program.

[0073] S1, obtaining a working mode of a cleaning apparatus when the cleaning apparatus is working;

[0074] S2, determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and

[0075] S3, controlling the side brush of the cleaning apparatus to rotate at the target rotational speed.

[0076] Obviously, it should be understood by a person skilled in the art that the above-mentioned modules or steps in the present disclosure can be implemented by a general computing apparatus, which may be concentrated on a single computing apparatus or distributed on a network including a plurality of computing apparatuses, and may be implemented by a program code executable by a computing apparatus, thus the modules or steps may be stored in a storage apparatus and implemented by the computing apparatus. In addition, in some cases, the steps shown or described may be performed in an order different from that described herein, or may be made into individual integrated circuit modules, or a plurality of the modules or steps may be made into a single integrated circuit module. In this manner, the present disclosure is not limited to a combination of any specific hardware and software.

[0077] The above descriptions are merely preferred embodiments of the present disclosure and are not intended to limit the present disclosure. For a person skilled in the art, the present disclosure may have various modifications and variations. Any modifications, equivalent substitutions, improvements, and the like made within the principle of the present disclosure should be included within the protection scope of the present disclosure.

CLAIMS

1. A method for controlling rotation of a side brush, comprising:

obtaining a working mode of a cleaning apparatus when the cleaning apparatus is working;

determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and

controlling the side brush of the cleaning apparatus to rotate at the target rotational speed.

2. The method according to claim 1, wherein the determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned comprises:

in a case that the cleaning apparatus is in a first working mode, determining the target rotational speed of the side brush according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle comprises the size information of the obstacle.

3. The method according to claim 2, wherein the determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned comprises:

in a case that the cleaning apparatus is in a second working mode, determining the target rotational speed of the side brush according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle comprises the type information of the obstacle.

4. The method according to claim 1, wherein the determining a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning

apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned comprises:

in a case that the cleaning apparatus is in a second working mode, determining the target rotational speed of the side brush according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned, wherein the information of the obstacle comprises the type information of the obstacle.

5. The method according to claim 2, wherein, in a case that the cleaning apparatus is in a first working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to size information of the obstacle detected by the cleaning apparatus in the area currently being cleaned comprises:

in a case that the size information of the obstacle is determined to be greater than or equal to a preset size threshold according to the size information, determining that the target rotational speed of the side brush is a first rotational speed; or

in a case that the size information of the obstacle is determined to be smaller than the preset size threshold according to the size information, determining that the target rotational speed of the side brush is a second rotational speed, wherein the first rotational speed is greater than the second rotational speed.

6. The method according to claim 3, wherein, in a case that the cleaning apparatus is in a second working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned comprises:

in a case that it is determined that the obstacle has a sharp corner according to the type information, determining that the target rotational speed of the side brush is a third rotational speed, wherein an angle of the sharp corner is smaller than or equal to a preset angle threshold; or

in a case that it is determined that the obstacle does not have a sharp corner according to the type information, determining that the target rotational speed of the side brush is a fourth rotational speed, wherein the third rotational speed is greater than the fourth rotational speed.

7. The method according to claim 4, wherein, in a case that the cleaning apparatus is in a second working mode, the determining the target rotational speed of the side brush of the cleaning apparatus according to type information of the obstacle detected by the cleaning apparatus in the area currently being cleaned comprises:

in a case that it is determined that the obstacle has a sharp corner according to the type information, determining the target rotational speed of the side brush is a third rotational speed, wherein an angle of the sharp corner is smaller than or equal to a preset angle threshold; or

in a case that it is determined that the obstacle does not have a sharp corner according to the type information, determining the target rotational speed of the side brush is a fourth rotational speed, wherein the third rotational speed is greater than the fourth rotational speed.

8. The method according to claim 2, wherein the method further comprises:

in a case that the cleaning apparatus is in the first working mode and no obstacle is detected by the cleaning apparatus, determining that the target rotational speed of the side brush is a first rotational speed.

9. The method according to claim 2, 5 or 8, wherein the first working mode comprises arcuate route sweeping.

10. The method according to claim 2, 5 or 8, wherein the first working mode comprises spiral type route sweeping.

11. The method according to claim 2, 5 or 8, wherein the first working mode comprises circular route sweeping.

12. The method according to claim 3 or claim 4, wherein the second working mode comprises sweeping along an edge.

13. The method according to claim 6 or claim 7, wherein the second working mode comprises sweeping along an edge.

14. A control apparatus for controlling rotation of a side brush, comprising:

an obtaining module configured to obtain a working mode of a cleaning apparatus when the cleaning apparatus is working;

a determining module configured to determine a target rotational speed of the side brush of the cleaning apparatus according to the working mode of the cleaning apparatus and information of an obstacle detected by the cleaning apparatus in an area currently being cleaned; and

a controlling module configured to control the side brush of the cleaning apparatus to rotate at the target rotational speed.

15. A cleaning apparatus, comprising the apparatus according to claim 14.

16. A storage medium, wherein a computer program is stored in the storage medium, and the program is executed by a terminal device or a computer to perform the method according to any one of claims 1 to 13.

17. An electronic device, comprising a memory and a processor, wherein a computer program is stored in the memory, and the processor is configured to execute the computer program to perform the method according to any one of claims 1 to 13.