Robot vacuum cleaner working principle

The vacuum cleaner has a three-stage cleaning function of lifts, suction, and filtering dust. There is a rolling brush in the middle of the bottom to roll up large debris and dirt on the ground; Two relatively rotating side brushes are installed on the left front and right front of the bottom to increase the effective cleaning area, and sweep the dust and trash at the corners and under the furniture into the vacuum cleaner.

When the machine is working normally, the DC motor in the vacuum cleaner drives the fan impeller to rotate at a high speed, so that the air is discharged at a high speed. An instantaneous vacuum is generated inside the vacuum cleaner, which forms a negative pressure difference with the outside atmospheric pressure. Under the action of the pressure difference, the air at the front suction port is constantly replenished, and the vacuum cleaner sucks in dusty air, which has been filtered by the dust filter and discharge the clean air. The filtered garbage is collected in the dust bin. The running driving part is the main part of the robot vacuum cleaner, which generally adopts a wheeled mechanism. At the rear of the bottom of the fuselage, there are two suspended driving rollers. The front of the fuselage is supported by a universal wheel and the rear wheel to form a triangle.

When working, two stepping motors drive two rear wheels to push the vacuum cleaner to move. This structure is simple and improves the flexibility of turning. Because the robot vacuum works while walking, the moving speed requirement is relatively low, generally around 3m/min. Due to the stepper motor not suitable for running at low speed, a set of reduction gears are added between the motor shaft and the wheel shaft to avoid the low speed crawling of stepper motor and realize the low-speed crawling of the vacuum cleaner. The frequency and phase sequence of the driving pulse signal are changed by the single-chip in machine, so as to realize the high-precision speed regulation, stop and direction adjustment of the two driving wheels. At the same time, when the same or different pulse signals are applied to the two motors, the forward, left, right, backward, and U-turn functions of the vacuum cleaner can be easily realized through the differential mode. Even when the two rear wheels move in opposite directions, it can be rotate in place around the midpoint of the axis.

The cleaning route is one of the important indicators of the robot vacuum cleaner. At present, the cleaning route has two types: planned and random. The random cleaning mode is to randomly walk and clean each area after the robot vacuum perceives the surrounding environment; the planned cleaning mode is to follow the preset

planned path after the robot perceives the environment, effectively traversing each area to complete each cleaning. The planned cleaning paths usually include: spiral mode, bow mode, side walking mode, pentagon mode, random (automatic walking). In order to adapt to different ground environments and be able to clean more thoroughly, the robot vacuum has a variety of cleaning modes (walking paths), which can be selected as needed. The number of preset modes varies with different product models. The following four modes are commonly used:

① AUTO (automatic cleaning) mode: This mode has the largest cleaning coverage area and is the most commonly used one. Its character is that the robot work in a straight line to clean, and changes direction after encountering obstacles. If the robot detects a large amount of dust, it will automatically clean in "fan" or "spiral" route, and then return to straight line. This cleaning mode means that the robot automatically cleans, and automatically changes direction after encountering obstacles. In this cleaning mode, the machine recognizes the complexity of the surrounding environment according to the built-in sensor, and automatically switches the built-in cleaning path. It is a mode with multiple cleaning paths.

② Spot cleaning mode: Press the "spot cleaning" button on the remote control, and the machine will enter the spot cleaning mode. This mode is suitable for cleaning in a small area with relatively plenty of garbage. It runs in an involute spiral way from the center to the outer. When it reaches the outermost ring, it slowly shrinks in the opposite direction until it returns to the origin place to complete the cleaning. The cleaning radius is about 1m, and the time is about 2-3min.

③ Key area cleaning mode: This mode is suitable for processing more concentrated garbage on the ground. The robot will clean from left to right in Z-shaped path and do a centralized cleaning of your pointed area. After the cleaning completed, the robot will return to the starting place and give a prompt sound.

④ Auto mopping mode: The robot vacuum combined sweeping, suction and dragging in one. After pressing the "mopping" button on the remote control or pressing the corresponding key on the panel, the robot will enter the auto mopping mode. At the same time, side brush and fan will stop working, and only the machine drives the mop to work. The customer can press "z-shape" and "random" to mop the floor.

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Radiation Exposure Statement

To comply with FCC RF exposure compliance requirements, this grant is applicable to only mobile configurations. The antennas used for this transmitter must be installed to provide a separation d istance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.