Design and Implementation of Intelligent Cleaning Machine based on Internet of Things

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Abstract

With the development of science and technology and people's pursuit of high-level life, we put forward an intelligent cleaning machine based on the Internet of Things, designed the body structure of the cleaning machine, and analyzed the working principle of the cleaning machine. Intelligent cleaning machine can replace time-consuming and laborious manual cleaning, and can replace manual cleaning of difficult places, such as under beds and sofas. This machine improves the traditional intelligent cleaning machine, realizes the remote monitoring of mobile terminal, improves the cleaning quality and meets the needs of modern fast-paced life.

Keywords

Internet of Things; Cleaning Machine; Home; Intellectual Ability.

1. Introduction

In modern life, people's requirements for quality of life are getting higher and higher, and intelligent cleaning machines are recognized and used by more and more people. However, there are still some areas for improvement in the current intelligent cleaning machines. For example, the current intelligent cleaning machines are not humanized enough, and it is not possible to freely monitor the cleaning machines remotely at any time and anywhere through personal mobile monitoring terminals and other devices. In addition, when the cleaning machine cleans corners, the cleaning machine cannot accurately clean corners due to the angle, resulting in low cleaning quality. Spottles Internet of Things intelligent cleaning machine has improved the traditional intelligent cleaning machine in view of these two shortcomings.

2. Overall Structure

The intelligent cleaning machine of the Internet of Things in Spottles comprises a cleaning machine body, wherein the top outer wall of the cleaning machine body is provided with a camera mechanism, both side outer walls of the cleaning machine body are provided with a mosquito killer, the bottom outer wall of the cleaning machine body is welded with a dust collecting disc, the top outer wall of the dust collecting disc is provided with a cleaning mechanism, the top inner wall of the cleaning machine body is provided with a speed sensor, the top inner wall of the cleaning machine body is provided with a motor, The outer wall at the bottom of the rotating rod is connected to the outer wall at the top of the dust collecting disc through bearings; the outer wall at the bottom of the cleaner body is provided with a fan; the input end of the fan and the inner wall at the top of the dust collecting disc are connected with the same dust collecting pipe through flanges. The camera mechanism comprises a fixed block, and a camera is arranged on the outer wall of one side of the fixed block. The cleaning mechanism comprises a micro cleaning brush and a large cleaning brush, and the micro cleaning brush is positioned on both sides of the large cleaning brush. Six fixed rods with the same size and equidistance distribution are welded on the outer wall of the bottom of the dust suction disk, and universal wheels are arranged on the outer wall of the bottom of the fixed rods. The outer wall of one side of the cleaner body is provided with a charging port and an opening key; the outer wall of one side of the cleaner body is provided with an opening; and the inner wall of one side of the opening is connected with a box door through a hinge. A distance sensor and a dust box are arranged on the inner wall of the bottom of the cleaner body, and angle sensors are arranged on both inner walls of the cleaner body. The top inner wall of the dust box and the output end of the fan are connected with

the same dust guide pipe through flanges, and the outer wall of one side of the dust guide pipe is connected with an electromagnetic valve through threads.

3. Hardware setup and function realization

3.1 Distance sensor

Ultrasonic wave has the characteristics of small diffraction, good directivity and directional propagation. Ultrasonic sensor is mainly used to measure distance. The sensor has a transmitting and receiving device for sound waves. The transmitted ultrasonic waves return after hitting obstacles. The distance of obstacles is calculated by the time difference between transmission and return and the propagation speed of sound waves in the air. The ultrasonic sensor is used as a distance sensor for calculating distance.

3.2 Mosquito killing device

Carbon dioxide exhaled by human beings has been scientifically proved to be a substance that attracts mosquitoes. Photocatalyst mosquito killer can generate light, heat, carbon dioxide, water vapor and flowing air that mosquitoes like when working, simulate human breath to lure mosquitoes, attract mosquitoes away, and fall into mosquito catching cyclone to dehydrate and dry them to death. Photocatalyst can also purify air and sterilize. The small mosquito killer is embedded into the outer wall of the cleaner, and when the cleaner cleans the sofa bottom and bed bottom, the mosquito killer is turned on, which can not only illuminate the camera, but also kill mosquitoes under the bed and sofa.

3.3 Cleaning device

A cleaning mechanism connected with the dust suction disk comprises a micro cleaning brush and a large cleaning brush, and the micro cleaning brush is positioned on both sides of the large cleaning brush. The micro-cleaning brush is set at a certain angle, so as to clean the gap which cannot be cleaned by the traditional cleaning machine. Thereby solving the problem of low cleaning quality of the traditional cleaning machine.

3.4 Remote monitoring device

By setting up the camera, the position cleaned by the cleaning machine can be photographed by the camera, and the signal can be transmitted to personal mobile monitoring terminal and other equipment through the wireless local area network module to remotely monitor the cleaning machine anytime and anywhere.

4. Concrete implementation

With reference to figs. 1-3, the intelligent cleaning machine of the internet of things in spades comprises a cleaning machine body 1, wherein the top outer wall of the cleaning machine body 1 is connected with a camera mechanism by screws, and both side outer walls of the cleaning machine body 1 are connected with a mosquito killer 2 by screws; a dust suction plate 3 is welded on the bottom outer wall of the cleaning machine body 1, and a cleaning mechanism is fixed on the top outer wall of the dust suction plate 3 by screws. The motor 15 is fixed on the top inner wall of the cleaner body 1 by screws, and the output shaft of the motor 15 is connected with the rotary rod 14 through a coupling, and the bottom outer wall of the rotary rod 14 is connected with the top outer wall of the dust collecting tray 3 through bearings.

The camera mechanism of the intelligent cleaning machine includes a fixed block 16, and the outer wall of one side of the fixed block 16 is connected with a camera 22 by screws. The cleaning mechanism includes a micro-cleaning brush 4 and a large cleaning brush 5, and the micro-cleaning brush 4 is located on both sides of the large cleaning brush 5. Six fixed rods 19 with the same size and equidistantly distributed are welded on the outer wall of the bottom of the dust suction plate 3, and the outer walls of the fixed rods 19 are all connected with universal wheels 20 by screws.
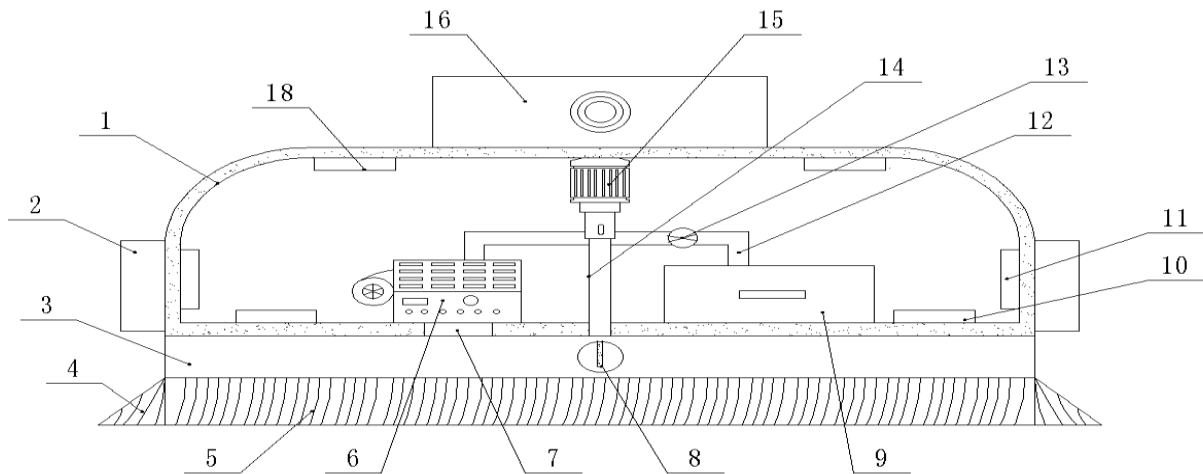
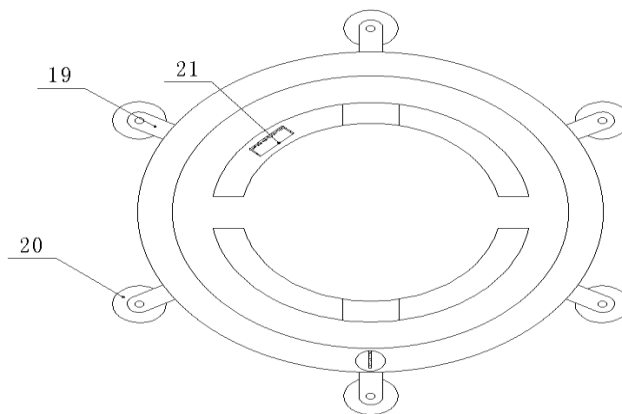Figure 1. Schematic diagram of the structure of Spitlers Internet of Things intelligent cleaning machine

Figure 2. Top view of the Spitlers Internet of Things intelligent cleaning machine

A charging port 21 and an opening key 8 are arranged on one side of the outer wall of the cleaner body 1. An opening is opened on one side of the outer wall of the opening, which is connected with a box door 23 by hinges. The distance sensor 10 and the dust box 9 are fixed on the bottom inner wall of the cleaner body 1 by screws, and both side inner walls of the cleaner body 1 are connected with angle sensors 11. The top inner wall of the dust box 9 and the output end of the fan 6 are connected with the same dust guide pipe 12 by flanges, and one side of the dust guide pipe 12.
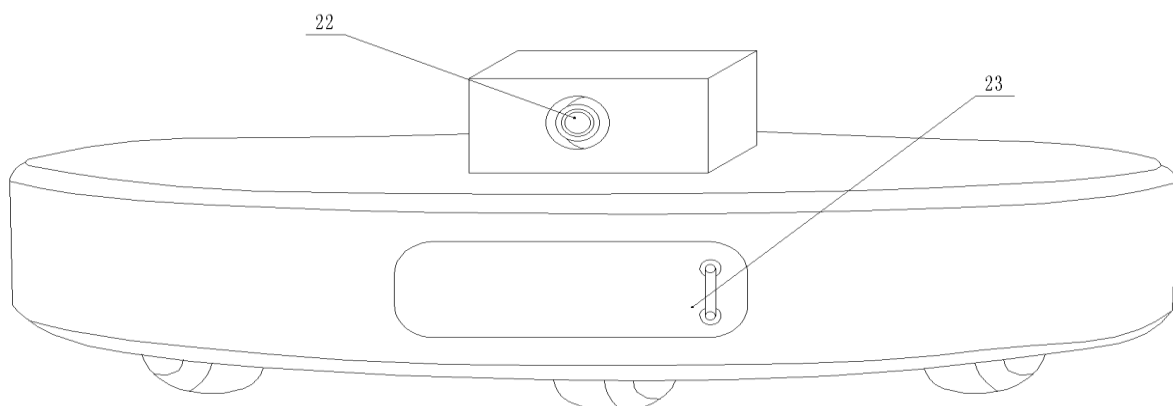

Figure 3. Schematic diagram of the external structure of Spitlers Internet of Things intelligent cleaning machine

Fig. 1 is a schematic diagram of the structure of Spitlers Internet of Things intelligent cleaning machine;

Fig. 2 is a top view of the Spitlers Internet of Things intelligent cleaning machine;

Fig. 3 is a schematic diagram of the external structure of Spitlers Internet of Things intelligent cleaning machine.

In the drawing: 1- cleaner body, 2- mosquito killer, 3- dust suction plate, 4- micro cleaning brush, 5- big cleaning brush, 6- fan, 7- dust suction pipe, 8- on/off key, 9- dust box, 10- distance sensor, 11- angle sensor, 12- dust guide pipe, 13- electromagnetic valve

Connect the equipment to the power supply, turn on the switch key 8, shoot the cleaned position of the cleaner body 1 by the camera 22, transmit the signal to personal mobile monitoring terminal and other equipment through the wireless local area network module, remotely monitor the cleaner at any time and place, turn on the motor 15, and the motor 15 drives the rotating rod 14 to rotate, so that the micro-cleaning brush 4 and the large cleaning brush 5 start to rotate, and the micro-cleaning brush 4 is arranged in an inclined shape. The micro-cleaning brush 4 can be cleaned to a corner position, and the fan 6 can be turned on to suck the garbage swept by the micro-cleaning brush 4 and the big cleaning brush 5 into the dust box 12. When the cleaning is finished, the opening key 8 can be turned off.

5. Tag

By improving the traditional intelligent cleaning machine, the new Spatholes Internet of Things intelligent cleaning machine greatly improves the cleaning quality of the cleaning machine, adds the function of killing mosquitoes, and realizes the personal mobile monitoring terminal and other equipment to remotely monitor the cleaning machine anytime and anywhere. The system has complete functions, meets the cleaning needs of daily life, has strong usability and is closer to life.

Acknowledgments

References

[1] Shen Shuangqin. Design of intelligent sweeping robot based on MSP430 [J]. Innovation and Application of Science and Technology, 2019(13):93-94.

[2] Zhou Xiaojun, Meng Liang, Yang Hui, Lei Chao, Wang Hua, Hu Qiaolong. Development of multifunctional and efficient cleaning machine [J]. Laboratory Science, 2013,16(04):171-173+179.

[3] Wang Teng. Control system design of sweeping robot based on STM32 [D]. Nanchang University, 2019.

[4] Guan Si. Design Innovation of Intelligent Cleaning Robot [D]. Nanchang University, 2018.

[5] Liu Lina. application strategy of artificial intelligence technology in sweeping robot [J]. electronic technology and software engineering, 2019(05):239.

[6] Meng Mi. Analysis of Internet of Things Technology and Application Strategy [J]. Shandong Industrial Technology, 2019(11):165.

[7] Gao Zhaofa, Sun Shuling. Wireless LAN technology and its application based on IEEE802.11 [J]. Shandong Communication Technology, 2004(02):1-10.

[8] Zhang Hongyan, Huang Baofeng, Guo Chongye, Gan Guangyao. Network video sweeping robot based on STM32 [J]. Electronic Testing, 2019(08):37-38.

[9] Deng Yun, Li Chaoqing, Cheng Xiaohui. Design of smart home remote wireless monitoring system based on Internet of Things [J]. Computer Applications, 2017,37(01):159-165.