Journal of Electronics and Information Science (2022)
Clausius Scientific Press, Canada

DOI: 10.23977/jeis.2022.070117
ISSN 2371-9524 Vol. 7 Num. 1

Design Study of a New Type of Flat Body Cleaning Device

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Keywords: Flat Body, Cleaning device, Universality, Security

Abstract: In fact, most electronic devices will absorb more dust on the surface of the screen after a long time of use, and the traditional flat-body device cleaning method has many problems such as incomplete cleaning, damage to the device easily and certain some dangers, especially in the case of flat-body devices with larger specifications or more special materials, the requirements of the cleaning method are more demanding. In order to solve the above problems better, we propose to use electric signal and sensor technology to realize the development of automatic cleaning device for large and small flat body surface. The device consists of mechanical parts, stm32 microcontroller, control and monitoring module, and cleaning and realization module, each module is complementary to each other to achieve meticulous cleaning of the surface of the flat body.

1. Introduction

In daily life for the flat body cleaning method mostly use organic solvents (alcohol, etc.) to wipe[1], this method is also the traditional way of flat body cleaning[2]. Affected by the plane body itself, the traditional cleaning method is easy to cause damage to the surface plating of the plane body of metal or electronic materials, the plane body of the screen material, the screen itself will be damaged; most of the electronic screen type plane body, such as the edge of the laptop screen, the edge of the TV display will have gaps, although the possibility of water can be greatly reduced by wiping, but the traditional wiping method will still have The risk of water ingress due to excessive water volume.

2. Related Work

2.1 Analysis of the Need for a New Flat-body Mechanical Cleaning Device

With the progress of science and technology and social development, especially affected by the accelerated pace of life and increased work pressure, people want to be freed from the tedious daily household cleaning affairs, which is undoubtedly the demand for mechanical cleaning. On the other hand, with the increasing standardization of urban management, urban residents have higher and higher requirements for quality of life, and people's requirements for living environment are becoming more and more stringent. The development of new cleaning equipment has ushered in an unprecedented opportunity. With the continuous development of sustainable development policies, cleaning equipment that can be applied to different scenarios will play an increasingly critical role in the cleaning process. How to supplement and improve the field based on efficient cleaning and low

cost methods and solve the above problems, this project proposes a new flat body mechanical cleaning device, which not only enables cleaning of different sizes of flat bodies, but also reduces the contact damage and cuts caused in cleaning.

2.2 Project Meaning

This project is an improvement from the previous traditional method of manual cleaning and blind cleaning. The cleaning device has perfected the field of flat body cleaning through a tightly designed cleaning device, which facilitates people's daily life. This device is somewhat unaffected by extreme weather and dangerous environment. It not only solves the safety hazard of exposure to toxic gases and pathogens during cleaning, but also reduces the cost of human and material resources.[3]

It has broad application and development prospects. The planar mechanical cleaning device market is in a period of continuous development and growth. To continuously improve the user experience and fit the needs of the actual function, cleaning devices will continue to evolve and improve.

2.3 Research Status and Development

For the traditional automatic cleaning of flat body displays, high-pressure water jet cleaning [4], ultrasonic cleaning [5] and other methods have mature technology. But for the different needs of different screens, the development of the cleaning display industry also needs to be based on the actual situation, to understand the development needs of each industry, so as to choose a suitable way to produce and use equipment. For example, in high-rise buildings, the cleaning of the screen is extremely inconvenient, most of the wiping equipment available on the market use electrostatic adsorption to solve the outer screen cleaning [6], this cleaning device in the actual application of low efficiency, not enough suction when moving, suction is too small is not safe enough, suction is too large and difficult to pull and other shortcomings.

This paper is to introduce this new flat body mechanical cleaning device with a moderate size of the display screen as an example, the device has the advantages of high efficiency, cleaning power, etc., can perfectly achieve the purpose of cleaning a large area of the display screen, you can use the device to clean the computer screen, theater display, shopping mall LED screen, high building glass and many other occasions. Its appearance will greatly reduce the cost of cleaning the surface of the plane body, improve production efficiency, will also greatly promote the development of the cleaning industry, bringing considerable social benefits, economic benefits, the future can be expected.

3. Research and Implementation Methods

3.1 Module Overview

In order to realize the above technical functions, the project provides the following design scheme of cleaning realization module applied to small and medium-sized flat bodies: as shown in Figure 1, it includes flat bodies, shells and cleaning brushes in the use scene. The surface of the flat body is sleeved with a shell, the front surface of the flat body is fitted with a cleaning brush, and the left and right surfaces of the shell are sleeved with pull rings, The rear end surface of the pull ring is welded with a pull rod, the inner surface of the pull ring is welded with a rotating rod, and the left surface of the rotating rod is welded with a rotating block, the rotating blocks are embedded in the rotating groove, and the rotating groove is embedded in the right surface of the shell, the surface of the rotating block is embedded with two groups of rolling grooves, and the rolling grooves are embedded with rolling parts, The surfaces of the rolling parts are all fitted with the inner wall surface of the rotating groove.

Including: 1. Plane body in the actual application scenario (here is the display); 2. Shell; 3. Cleaning brush; 4. Pull ring; 5. Pull rod (behind the screen, not shown in the figure); 6. Rotate the slot.

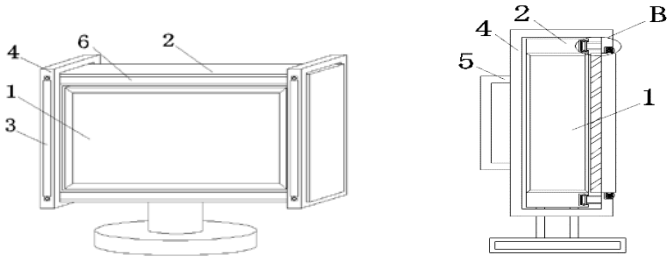

Figure 1: Cleaning implementation module under the use scenario of small plane body (front view)

3.2 Description of Module Cleaning Function

Please refer to Figure 2, the cleaning implementation module includes plane 1, shell 2 and cleaning brush 3. The surface of plane 1 is sleeved with shell 2, the front surface of plane 1 is fitted with cleaning brush 3, the left and right sides of shell 2 are sleeved with pull ring 4, and the rear surface of pull ring 4 is welded with pull rod 5, The inner surface of the pull ring 4 is welded with a rotating rod 10, and the left surface of the rotating rod 10 is welded with a rotating block 7. The rotating blocks 7 are embedded in the rotating groove 6, and the rotating groove 6 is embedded in the right surface of the housing 2. The surface of the rotating block 7 is embedded with two groups of rolling grooves 8, and the rolling grooves 8 are embedded with rolling parts 9, and the surfaces of the rolling parts 9 fit with the inner wall surface of the rotating groove 6.

When the surface of the plane body 1 needs to be cleaned, pull the pull rod 5 to make the pull rod 5 drive the pull ring 4 to move, the pull ring 4 drives the rotating rod 10 to move, so that the rotating rod 10 drives the rotating block 7 to move, the rotating block 7 drives the rolling groove 8 to move, so that the rolling groove 8 drives the rolling part 9 to roll against the inner wall of the rotating groove 6, and the rotating block 7 moves inside the rotating groove 6, The pull ring 4 drives the cleaning brush 3 to move close to the plane body 1, so as to clean the surface of the display screen 1 and improve the practicability of the device.

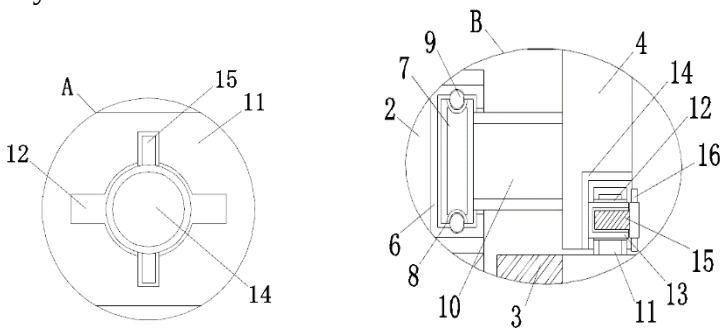

Figure 2: Enlarged structure of cleaning and realization module A and B

Acknowledgements

"Project 202110635025 supported by National Training Program of Innovation and Entrepreneurship for Undergraduates"

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