

Design and Research of an Intelligent Ironing Machine

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ABSTRACT: As a good helper in human life, ironing machine has the function of fast ironing clothes. Different from the traditional hand-held hanging ironing machine and electric iron, this paper creatively proposes an intelligent ironing machine which can automatically identify the types of clothes and iron them. The machine is equipped with various sensors and controlled by Arduino single chip microcomputer. It has the intelligent ironing functions such as intelligent temperature control and timing.

Keywords: *intelligent ironing machine, sensors, intelligent temperature control.*

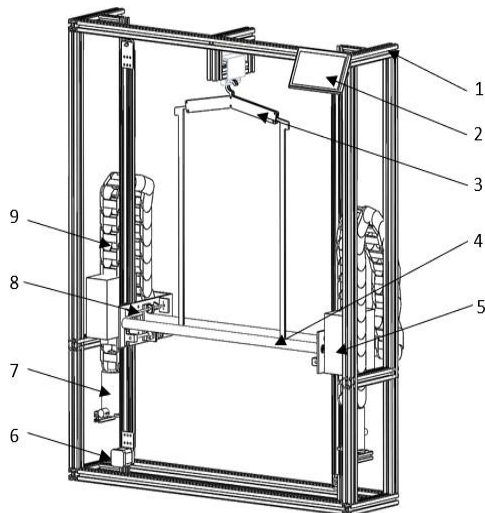
I. INTRODUCTION

At present, there are all kinds of ironing machines on the market, but most of them can not completely free people's hands. Therefore, we propose a clothe ironing device which can automatically identify and iron clothes with pressure sensor. It has the advantages of simple structure, simple operation and high degree of automation. Just hang the clothes on the clothes hanger in the equipment. There are two modes: automatic mode and manual mode. If the clothes have no special requirements, as long as you select the automatic mode, the equipment can quickly complete the ironing process in a short time. If the clothes are made of special materials, you can also manually select the ironing mode to protect the clothes as much as possible. We design the device with the purpose to save manpower and material resources maximally. So that the heavy workload of ironing clothes becomes more easier. On the one hand, it saves a lot of time and can avoid waste, on the other hand, it increases the efficiency of ironing clothes.

II. Structural design of ironing machine

The ironing machine is mainly composed of clothe hanger module and hanging ironing module. The overall structure is relatively simple,

as shown in Figure 1.

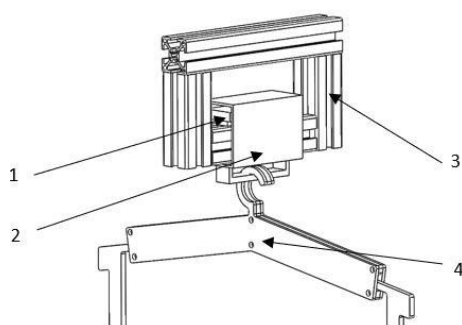


1-Aluminum profile frame 2 - display screen 3 - clothes hanger 4 - ironing rod 5 - water tank 6 - stepping motor 7 - water pump 8 - lead screw 9 - drag chain

Fig. 1 overall structure diagram of ironing machine

A. Coat hanger module

The structure of the ironing machine is composed of two parts. The first part is the shell of the ironing machine. The front side of the shell is equipped with an embedded display screen, a Bluetooth receiving module and a power switch from top to bottom. A water tank is mounted on the right side to replenish water to the ironing machine. A PVC rolling shutter door is set on the front to make the ironing machine beautiful and ensure the cleanliness of clothes at the same time. A pulley block is installed at the bottom to facilitate the overall movement of the ironing machine. A 6-inch touch screen is embedded in the shell of the ironing machine, which can directly display the ironing parameters such as material, ironing time, ironing temperature, humidity and so on. The second part is the clothing sensing module. The clothing sensing module can automatically identify the clothes after the user starts the ironing machine, and independently adopt the best way to iron the clothes smoothly, which makes the perfect combination of high effect and short time, improves the intelligence of the machine, saves people's time and makes them relaxingly. This achieves the effect of one click ironing. The coat hanger module is shown in Figure 2.



1-pressure sensor 2-hanger fixing sleeve 3-u-shaped support 4- hanger

Figure 2 Schematic diagram of coat hanger module structure

B. Ironing module

The ironing module consists of three parts: steam generator, belt conveyor system and ironing mechanism. The steam generator of the first part adopts double 1600W heating power steam generator, which produces steam rapidly and violently, which can ensure the sustainability of steam in the ironing process, improve the quality of ironing clothes, reduce the ironing time, make clothes more flat and increase the practicability of the ironing machine. The two steam generators are designed on both sides of the ironing machine. This saves the bottom space to a certain extent, reduces the height of the ironing machine, and does not impact the internal space. The synchronous belt of the second part is driven by the stepping motor, which can maximize the flexibility of the up and down movement of the ironing structure. At the same time, due to its own structural advantages, the stepping motor can be perfectly hidden in the bottom plate of the ironing machine, making the ironing machine more compact and delicate. Comparing with other structures, the synchronous belt has less noise and more plasticity, which is convenient for early model production and later use. It also speeds up the ironing speed to a certain extent, reduces the ironing time, brings convenience to life and saves valuable time. The ironing structure of the third part and the core part adopts the simplest straight plate ironing, which is simple and reliable in structure and is not easy to fail. At the same time, it can also ensure the ironing quality and enhance the user experience. The lightness of the structure enhances its mobility, so as to shorten the ironing time and do not change the ironing quality. The ironing board is non-contact type. The best ironing time is obtained through practice. Non- contact ironing can minimize clothing damage and mostly retain quality. Even the time is slightly longer, its benefits are more than disadvantages.

III. Control system design

The hardware structure of intelligent ironing machine includes: Arduino uno R3 development board, 24V aircraft model battery, adjustable voltage stabilizing module, Bluetooth module, pressure sensor, temperature sensor, humidity sensor, stepping motor, water pump, etc.

In terms of system control, Arduino uno R3 single chip microcomputer is selected as the main control module. Arduino is a very easy to use open-source hardware product. By using advanced programming language, calling various library functions, the numerous control functions are realized.

IV. Use method of intelligent ironing machine

After ensuring that there is water in the water tank of the ironing machine (the water level will automatically alarm if it is insufficient), the user will hang the clothes into the ironing machine and close the PVC rolling shutter door. If there are no special requirements for the ironing effect, the user can select the "auto" mode through the touch screen or app. The ironing machine will judge the ironing time and steam volume according to the basic conditions of the clothes, data is sent into the Arduino board by the detection module, so as to complete the basic ironing operation, If users have special requirements for clothes ironing, they can select clothes material, ironing time, ironing strength (steam volume) and other operations in the touch screen or app interface, so as to achieve their own satisfied ironing effect. After setting, the rolling shutter door will be automatically locked to prevent steam scald, the Arduino board will send the instructions of the up and down movement of the ironing rod and the steam will be generated by the steam generator (the movement time and the

amount of steam will be sent by the Arduino board together). After ironing, the ironing machine will give an alarm and unlock the PVC rolling shutter door. The user can take out the ironed clothes.

V. Summary

This paper discusses the overall structure and control principle of the intelligent ironing machine in detail, demonstrates the process of ironing clothes, and shows the intelligence of the ironing machine conducted by the human-computer interactive module. With the acceleration of social rhythm, our machines can independently adopt the best way to iron clothes, perfectly combine good effect and short time, improve the intelligence of the machine, make users more relaxing and time-saving, achieve the effect of one click ironing, and add a trace of convenience to today's fast pace life.

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