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Design of the Robot for Goods Transportation in Shops

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Abstract: *This project discloses a shop cargo transport robot, which includes a robot shell, a signal processing unit, a mobile seat and a multi-layer cargo placing rack. The robot shell is fixed on the mobile seat with a mobile wheel at the bottom, and the multi-layer cargo placing rack is located in the robot shell from top to bottom. The signal processing unit is installed on the robot shell and used to control the robot to walk and store articles. The multi-layer goods placing rack comprises a large goods placing rack, a small goods placing rack and a scattered goods placing rack, and a conveyor belt is installed on the bottom surface of the large goods placing rack; The outer sides of the small goods placing rack and the scattered goods placing rack are both provided with fastening covers; The top surface of the robot shell is provided with a storage slot, and one side of the robot shell is fixed with a cup holder. The customer's goods can be classified and placed, large goods are easy to store, and special storage space is provided for scattered goods, which is more practical and more humanized and rational in design.*

Keywords: *shops, goods, transportation, robots*

1. Introduction

Transport robot is an indispensable intelligent tool in modern industrial production, which can automatically transport materials in two places without human intervention. In practical application, using computer to manage, the workspace and storage management area are designed separately and managed in a unified way, which can simplify intermediate links, weaken human errors and improve work efficiency. Implementing large-scale work in a small area to reduce the consumption of fault time in the production process is very suitable for the requirements of modern industrial production. It greatly reduces the heavy physical labor of human beings in factories, studios and schools, and has a wide application prospect in industries such as cargo processing centers, intelligent processing and manufacturing, and automobile automation production lines.

At present, the schedule work of supermarket goods is mainly manual. With the emergence of intelligent service robots, many supermarket products have begun to try to use supermarket commodity robots, which can not only attract consumers, but also make supermarket commodity services smarter and safer. At present, the service robots used in supermarket products are mainly automatic delivery of goods and restaurant service. The existing supermarket goods automatic delivery robot mostly aims at large goods in the process of transporting goods, which is inconvenient for storing and taking scattered goods[1-2].

2. Project content

The purpose of this project is to provide a shop cargo transport robot to solve the problems existing in the above-mentioned prior art, which is convenient for customers to store different types of goods and take them conveniently.

In order to achieve the above objectives, this project provides the following scheme: this project provides a shop cargo transport robot, including a robot shell, a signal processing unit, a mobile seat and a multi-layer cargo placing rack, wherein the robot shell is fixed on the mobile seat with a mobile wheel at the bottom, and the multi-layer cargo placing rack is sequentially located in the robot shell from top to bottom, and the signal processing unit is installed on the robot shell and used for controlling the robot to walk and store articles;

The multi-layer cargo placing rack comprises a large cargo placing rack, a small cargo placing rack and a scattered cargo placing rack, wherein a conveyor belt is installed on the bottom surface of the large

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cargo placing rack, and a motor for driving the conveyor belt to rotate is electrically connected with the signal processing unit; The outer sides of the small goods placing rack and the scattered goods placing rack are both provided with fastening covers; The top surface of the robot shell is provided with a storage slot, and one side of the robot shell is fixed with a cup holder.

The outer wall of the mobile seat is sleeved with an anti-collision protective washer.

Cameras are installed on the four sides of the mobile seat, which are electrically connected with the signal processing unit, and are used to check the road conditions around the robot and judge the moving direction.

The size of the bottom of the robot shell is smaller than the size of the top surface of the mobile seat, and an inclined conveyor belt is also arranged between the outer edge of the large cargo placing frame and the front edge of the mobile seat, and a motor for driving the inclined conveyor belt to rotate is electrically connected with the signal processing unit[3-4].

The top of the robot shell is provided with a hook.

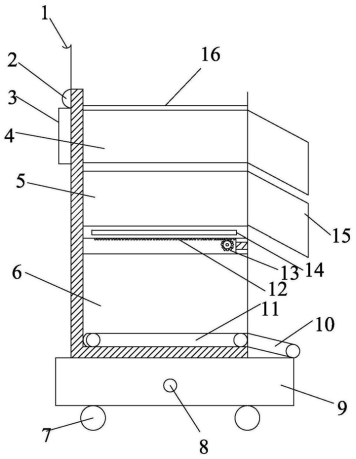
The storage slot on the top surface of the robot shell comprises a mobile phone storage slot and a computer storage slot, wherein the computer storage slot is used for storing a laptop or a tablet, and the computer storage slot is provided with a safety fastening belt for fixing the laptop or the tablet.

The bottom of the small goods placing rack and the scattered goods placing rack are both provided with a horizontal moving mechanism, which comprises a moving frame, two sides of the moving frame are fixedly connected with sliding bars, two sides of the inner wall of the robot shell are provided with sliding grooves matched with the sliding bars, the bottom of the moving frame is fixedly connected with a rack, the bottom of the rack is meshed with a gear, and a motor is fixedly installed on one side of the inner wall of the robot shell close to the gear, and the output shaft of the motor is fixedly connected with the axis of the gear.

The signal processing unit comprises a GPS positioning module electrically connected with a rechargeable battery, a wireless communication module, a touch screen and a face recognition camera, wherein the GPS positioning module and the wireless communication module are electrically linked with a supermarket commodity background control center, the touch screen and the face recognition camera are located at the top of the robot shell, and the touch screen is used for workers or customers to operate the delivery robot; Face recognition camera is a wide-angle camera, which can accurately identify customers.

3. Be innovative

The supermarket goods delivery robot in this project is equipped with multi-layer goods placing racks, which can classify and place customers' goods, make large goods easy to store, and provide special placing space for scattered goods, with better practicability and more humanized and rational design.



Among them, 1 hook; 2 face recognition camera; 3 touch screen; 4 shelf for scattered goods; 5 small cargo rack; 6 large cargo rack; 7 moving wheel; 8 camera; 9 moving seat; 10 inclined conveyor belt; 11 conveyor belt; 12 rack; 13 gears; 14 slider; 15 Fasten the cover; 16 storage slot.

Figure 1: Schematic diagram of the overall structure of supermarket commodity delivery robot.

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4. Implementation mode

As shown in fig. 1, a shop cargo transport robot provided by this embodiment includes a robot shell, a signal processing unit, a moving seat and a multi-layer cargo placing rack, wherein the robot shell is fixed on the moving seat with moving wheels installed at the bottom, and the multi-layer cargo placing rack is sequentially located in the robot shell from top to bottom, and the signal processing unit is installed on the robot shell and used for controlling the robot to walk and store articles;

The multi-layer cargo placing rack comprises a large cargo placing rack, a small cargo placing rack and a scattered cargo placing rack, wherein a conveyor belt is installed on the bottom surface of the large cargo placing rack, and a motor for driving the conveyor belt to rotate is electrically connected with the signal processing unit; The outer sides of the small goods placing rack and the scattered goods placing rack are both provided with fastening covers; The top surface of the robot shell is provided with a storage slot, and a cup holder (not shown in the figure) is fixed on one side of the robot shell[5-7].

The supermarket commodity delivery robot is provided with a plurality of layers of goods placing racks, and goods are classified and placed; after a large-sized goods box can be lifted by a customer or a supermarket commodity worker to a certain height to reach a moving seat, the signal processing unit can control the motor to rotate, so as to drive the conveyor belt to move the goods box to the inner side of the robot shell, which is convenient and convenient; and guardrails with adjustable widths are arranged on both sides of the robot shell, and the distance between the guardrails on both sides can also be adjusted according to the width of the goods box to adapt to goods boxes with different sizes; In small goods storage racks and scattered goods storage racks, items such as backpacks or other handbags can be placed in the robot shell by opening the locking cover, and then the locking cover can be closed, which can not only ensure the privacy of personal items, but also prevent the items from falling during the robot delivery process; Further, with the frequent use of laptops and tablet computers in daily life, most customers will carry laptops or tablet computers sporadically. The storage slot on the top surface of the robot shell includes a mobile phone storage slot and a computer storage slot, which is used to store laptops or tablets, and a safety buckle belt is arranged at the computer storage slot for fixing laptops or tablets. Customers can directly put the laptop or tablet computer in the storage slot at the top of the robot shell, and then fasten the safety strap at the storage slot, which is convenient for access. In order to ensure the safety of the laptop or tablet computer, a password switch lock can also be set at the buckle of the safety strap.

Cameras are installed on the four sides of the mobile seat, which are electrically connected with the signal processing unit, and are used to check the road conditions around the robot and judge the moving direction, and can avoid pedestrians or obstacles at any time. The outer wall of the mobile seat is sheathed with anti-collision protective washers, which reduces the collision of the robot shell and prolongs the service life.

In order to facilitate the placing of bulky goods in the bulky goods placing rack, the size of the bottom of the robot shell is smaller than the size of the top surface of the moving seat, an inclined conveyor belt is also arranged between the outer edge of the bulky goods placing rack and the front edge of the moving seat, and the motor driving the inclined conveyor belt to rotate is electrically connected with the signal processing unit, so that supermarket commodity workers or customers only need to gently lift the cargo box to the position of the moving seat, and the pressure sensor at the inclined conveyor belt senses the weight, It can be fed back to the signal processing unit, and then the motor driving the inclined conveyor belt to rotate is controlled to start running. Under the auxiliary force of the inclined conveyor belt, the cargo box can be easily transported to the large cargo rack, and then the conveyor belt drives the cargo box to be transported to the inside of the robot shell.

In addition, the top of the robot shell is provided with a hook, which is convenient for customers to hang plastic bags, U-shaped pillows or other items on the robot.

The bottom of the small goods placing rack and the scattered goods placing rack are both provided with a horizontal moving mechanism, which comprises a moving frame, two sides of the moving frame are fixedly connected with sliding bars, two sides of the inner wall of the robot shell are provided with sliding grooves matched with the sliding bars, the bottom of the moving frame is fixedly connected with a rack, the bottom of the rack is meshed with a gear, and a motor is fixedly installed on one side of the inner wall of the robot shell close to the gear, and the output shaft of the motor is fixedly connected with the axis of the gear.

The signal processing unit comprises a GPS positioning module electrically connected with a rechargeable battery, a wireless communication module, a touch screen and a face recognition camera,

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wherein the GPS positioning module and the wireless communication module are electrically linked with a supermarket commodity background control center, the touch screen and the face recognition camera are located at the top of the robot shell, and the touch screen is used for workers or customers to operate the delivery robot; Face recognition camera is a wide-angle camera, which can accurately identify customers[8].

When in use, the customer is identified by the face recognition camera, and after the identification is completed, the motor is started, the output shaft of the motor drives the gear to rotate, and the gear drives the rack to move, and the rack moves the luggage to the small goods placing rack or the scattered goods placing rack of the robot shell through the moving frame; Incline the conveyor belt and the conveyor belt to operate, and transfer the large cargo box into the robot shell; Customers put computers, water cups, etc. they carry on the robot shell correspondingly. After the storage is completed, the delivery robot judges the room position of the customers according to the pre-identified customer information. After the customers' goods are transported to the corresponding rooms, the conveyor belt and the inclined conveyor belt rotate in the opposite direction, and the large cargo boxes are removed. At the same time, the items in the scattered cargo racks and small cargo racks can also be taken out, and the customers can take out the computers, water cups and other items themselves.

5. Conclusions

After practical debugging and application verification, the system works stably, with high accuracy and stable performance, which meets the requirements of engineering application. In practical application, using computer to manage, the workspace and storage management area are designed separately and managed in a unified way, which can simplify intermediate links, weaken human errors and improve work efficiency. Implement large-scale work in a small area to reduce the consumption of fault time in the production process. This method is very suitable for the requirements of modern industrial production. With the rapid development of industrial production intelligence, transportation robot technology is also developing rapidly. It is of great significance to improve the system robustness of transport robots by learning from the research results of robots in the same industry at home and abroad.

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