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Intelligent sorting machine design applied to express industry

Zhirong Li [1, a], Yun Xu[1, b], Bingxing Li [1, c], Yuezhen Tao [1], Jun An [1]

[1]Sichuan University of Science & Engineering, Yibin Sichuan 644000, China

[a]yoursos@126.com, [b]xuyunzigong@163.com, [c]onlymelbx@126.com

Abstract

To express parcel logistics sorting at present, the existence of the low degree of automation, low sorting efficiency, poor accuracy and high cost problems, this article through the design of a new kind of intelligent sorting mechanism, using intelligent sorting system, sorting through to design a good experimental model experiment method, solve the existing problems of sorting system, realize express sorting efficiency and accurate.

Keywords

Express delivery, Sorting mechanism, Intelligent Systems.

1. Introduction

With the development and expansion of domestic e-commerce platforms, the express delivery industry has also developed rapidly.According to the existing statistics, since 2011, express business has been growing at a rate of nearly 50% every year.In 2015, the business volume of state-owned express enterprises reached 2.04 billion pieces, and the business revenue was 30.33 billion .Private express delivery enterprises completed 18.48 billion pieces of business, with business revenue of 224.6 billion.The business volume of foreign-funded express delivery enterprises has completed 150 million pieces, realizing business income of 22.03 billion. The annual express volume has reached 20.67 billion pieces, with the total value of express reaching 276.9 billion .According to the estimation of 1.3 billion people in China, the express delivery business has reached nearly 16 pieces per person per year, and the average delivery cost is 213 yuan per person per year. As shown in Figure 1

FIG.1 Development of express delivery business in China from 2011 to 2015

Behind these huge data needs advanced logistics system to support, a complete express logistics, including the collection and mailing, storage, sorting, transportation and distribution of several key parts, in which storage, sorting and transportation generally need to go through several times before goods can be delivered from the seller to the buyer.In these three links, the storage and transportation have been mechanized. Only the sorting work is not highly mechanized, and most of it is done

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manually, leading to low efficiency and high cost, which has become an important reason hindering the high-speed operation of express logistics and greatly reducing the profitability of logistics enterprises.Therefore, accelerating the research of mechanized express sorting system plays an important role in promoting the development of logistics industry and reducing logistics costs.In recent years, the research on mechanized intelligent sorting system based on the delivery address information of express packages has become a hot spot of intelligent equipment technology.In this paper, the problems of low efficiency, heavy labor dependence and high cost existing in the current express sorting system are studied. By designing a complete intelligent sorting system, the high efficiency and accuracy of express sorting are realized.

2. Principle of Intelligent Sorting System

Intelligent sorting system is a set of optical, mechanical and electrical, communications, automatic control technology in the integration of intelligent system equipment, system mainly involves online address coding, coding database storage and access, address bar code (qr code), information processing, sorting conveyor and sorting key technology such as automatic control, in which every technological success or not will directly affect the system efficiency, error rate and the reliability index, the key techniques such as intelligent sorting system is the product of high and new technology integration.The basic working principle of the intelligent sorting machine for express packages is shown in figure 2.

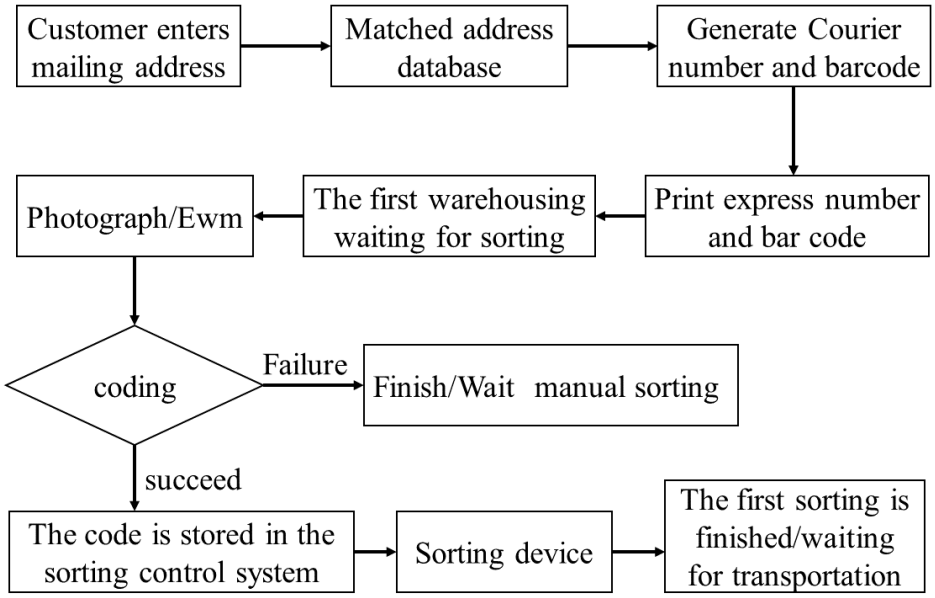

FIG.2 Basic principle of intelligent parcel sorting system

3. Intelligent Sorting Device Design

3.1 Coding System Design

At present, the Posting information of domestic circulating express bill mainly includes address information and bar code (actually, it is also the express bill number) information.The barcode has been printed on the express form in advance, and the address information is filled by the express user himself. Therefore, there is no one-to-one correspondence between the barcode information and the Posting address, which leads to the fact that the existing tracking number or Posting address cannot be used for automatic control of the sorting organization to realize sorting by address.Therefore, in order to facilitate the classification and sorting of express delivery according to the address, it is necessary to change the existing express delivery code from one that does not contain address information to one that contains address information.Therefore, it is necessary to upgrade the coding system, and use the online ordering system to automatically generate the express code according to

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the address information provided by the user, so as to complete the correspondence between the code and the Posting address.

3.2 Scanning/Decoding System Design

In order to obtain the code on the express bill, the scanning gun or the opposite bill can be used for image recognition.If a less efficient scanning gun is adopted, the corresponding barcode/qr code identification can be used to directly identify the code of the express bill. However, this method requires manual judgment of the position of the code on the express bill and manual scanning.If the address information is obtained through image identification of the express bill, it is necessary to take photos of the express bill. The program will automatically separate the barcode or two-dimensional code image from the image, and then decode the image to obtain the express bill number.This decoding method, from taking photos to decoding, is automatically completed by the computer, with a high degree of intelligence, which can significantly reduce the workload of manual participation.As shown in figure 2, is the two-dimensional code extraction camera.

FIG.3 Collect two-dimensional code camera device

3.3 Control System Design

Intelligence is the basis of the information, the core of intelligent is joined with the sensor as the core of mechanical and electrical integration, its ultimate performance is based on sensor information to decide how to action control system, which make the choice of control system has a certain logical thinking ability, judgment, making a series of automated terminal equipment according to receive the information to perform different actions.The control system designed in this paper is shown in figure 3. Sensor signals are also added into the research content of the control system in this paper, and the processing judgment of sensor signals will be introduced in the program control, so that different sorting actuators can have different processing results for the same sensor signals, so as to achieve the purpose of intelligent sorting.

3.4 Design of Sorting Actuator

In this study, the sorting actuator is the last electromechanical device to realize the sorting of express packages.Therefore, in the design of this organization, in order to introduce electronic control signals to realize automatic control, it is necessary to design the sorting executive into an automatic machine, so as to reduce the consumption of human resources and greatly improve the sorting efficiency.The following figure shows the driving mechanism of the sorting device and the overall test model of the intelligent sorting device.

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FIG.4 Control board of sorting system

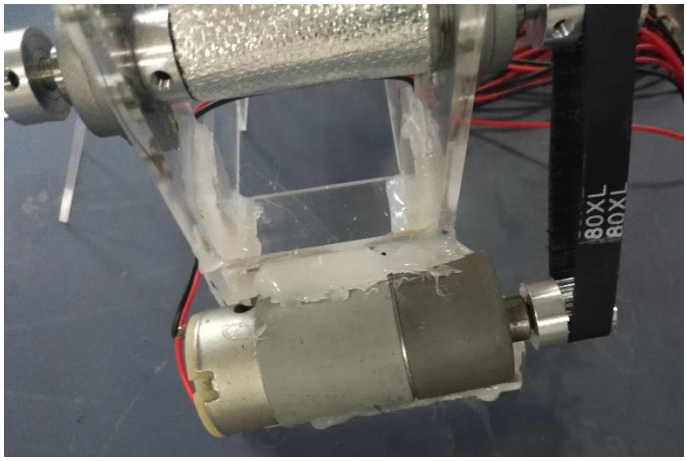

FIG.5 Drive motor of sorting machine

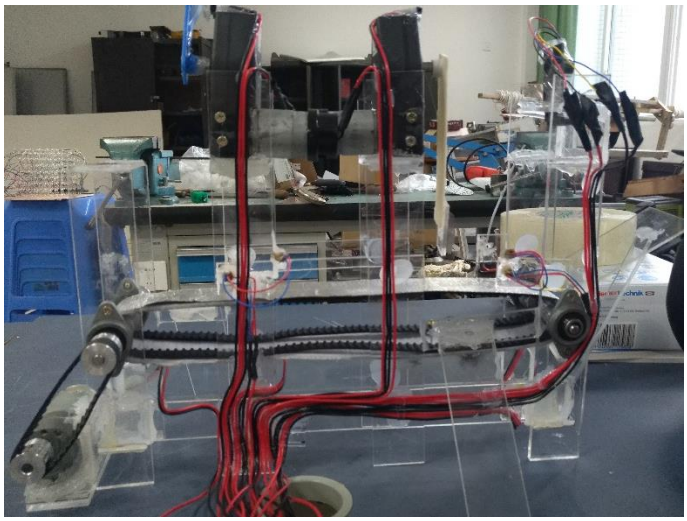

FIG.6 Intelligent Courier sorting machine model

4. Conclusion

Based on the analysis and research of various existing sorting devices, this paper designs a new intelligent sorting device for express delivery, makes an experimental model, and USES the package model for experimental verification.The results show that through the design of intelligent express sorting organization, the efficient and accurate sorting of express packages can be realized, and a

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large amount of labor input can be reduced, which lays a foundation for the rapid and efficient operation of the logistics industry.

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