Design and Research of Logistics Distribution System Based on RFID

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Abstract. It Introduces the Concept of RFID Technology and Logistics Distribution. According to Their Characteristics, It Designed and Studied a Logistics Distribution System with Its Overall Scheme, Hardware and Software. the System Can Identify and Track the Information of the Whole Acquisition and Supply Chain. It Can Provide Accurate Product Distribution Information for Suppliers, Manufacturers, Retailers and Consumers. It Can Greatly Save Time and Reduce Labor Costs, Simplify the Process of Logistics Distribution and Improve the Efficiency of Distribution.

1. Introduction
With the Development of Internet of Things (RFID, GPS, GIS), Many Problems in Logistics Industry Will Be Solved. the Internet of Things Has Been Applied in Logistics Industry for More Than 10 Years, Which Has Promoted the Process of Logistics Informationization and Made the Modern Logistics System Develop Towards Digitalization, Integration, Networking and Intellectualization. Intelligent Logistics Has Become the Application Goal of Logistics Field. the Application of RFID Technology in Distribution, Warehousing, Warehousing and Inventory Can Automatically Obtain All the Information of Goods, Change the Traditional Way of Reading and Recording Goods Information Manually, and Realize the Active Perception of Logistics Information.

2. RFID Technology and Logistics Distribution Characteristics

2.1 RFID Technology
RFID is a New Type of Automatic Identification Method, Which Uses Radio Frequency Technology to Achieve the Purpose of Identification by Wireless Information Transmission through Spatial Coupling. RFID System Generally Consists of Electronic Tag, Reader and Information Processing Module. among Them, Electronic Tag is an Electronic Micro-System Loaded with Response Module, Which Has Antenna and Chip inside. the Function of Antenna is to Realize Wireless Communication between High Frequency Module and High Frequency Module, While Chip is Used to Store Id Information of Equipment. Reader is a Kind of Recognizer, Which Can Acquire Information in Electronic Tag by Wireless Way and Send the Acquired Information to Information Processing Module. Data Processing and Statistics. the RFID Reader is Shown in Figure 1.
2.2 Logistics Distribution Concept

Logistics distribution refers to the process of transporting goods and materials from the supplier to the demander. It mainly includes weighing, packaging, warehousing, loading, transportation, unloading, distribution, information processing and other activities. Distribution center is the core of logistics distribution system. It is classified as service industry operation mode, operation process and logistics equipment, which is quite different from the operation process of manufacturing industry. From logistics center to distribution to consumers, logistics distribution center mainly achieves the following three functions:

1. Matching goods: Receive goods sent by different sellers, and then mix them into a batch of goods according to the same customer's list of goods.

2. Fusion distribution: merge the quantity of goods and the number of times of transportation to realize the synchronization of freight transportation time and the minimization of transportation cost.

3. Value-added products: increase the price of products through professional packaging,
commodity matching and processing.
In short, the logistics transportation center is to put goods in storage, sorting, and then to obtain quality testing, finally packaging and transportation, the final distribution. According to the functions of each module of logistics center, the classification can be carried out as shown in Figure 3.

Figure 3 Classification of Logistics Distribution Center Modules

3. The Overall Scheme of Logistics Distribution System Based on RFID
Logistics distribution system is complex in distribution, warehousing, warehousing, inventory checking. This paper introduces RFID to read and process these steps to achieve automated data, which can greatly reduce logistics sorting time, save labor costs, and improve the accuracy and management level of logistics distribution. Logistics distribution system based on RFID includes four layers: upper application, system interface, data platform and wireless perception. The overall scheme is shown in Figure 4.

Figure 4 the Overall Scheme of Logistics Distribution System Based on RFID

(1) Upper Application Layer
The upper application layer is the UI of terminal equipment, mainly the interaction between managers and users on the whole logistics distribution system. Among them, system administrators and users can register, login, modify orders and track the distribution of goods. The system database administrator is responsible for adding, deleting, modifying and checking background data. Inventory managers are responsible for warehousing, discharging, inventory and sorting and packaging of goods according to orders. Distribution managers are responsible for the management of distribution vehicles and transportation routes, and deliver goods according to orders, and feedback the results to the system.

(2) System Interface Layer
System interface layer is the communication interface between upper application layer and data platform layer. The latter provides data information for the former, while the former displays the latter's information on the terminal interface.

(3) Data Platform Layer
The data platform layer is the formatted storage and service of the whole logistics management data. According to the unused data, the corresponding algorithm and data format are used to manage the data. Provide data support for upper application layer.

(4) Perception Layer

The perception layer uses RFID as the underlying hardware technology to collect information such as goods distribution, warehousing, warehousing, inventory and so on. The reader has multi-label recognition technology, which can identify multiple goods labels at the same time.

4. Software and Hardware Design of Logistics Distribution System Based on RFID

4.1 Hardware Design of Logistics Distribution System Based on RFID

The hardware part of logistics distribution system based on RFID includes control system, handheld reader and warehouse management equipment. The hardware design block diagram is shown in Fig. 5.

**Figure 5** Hardware Design Block Diagram of Logistics Distribution System Based on RFID

1) Intermediate layer of RFID. The system includes data transmission between tag database and logistics management system. At the same time, the main device maintains and manages the storage reader, handheld reader, wireless device, database data monitoring and data server.

2) Data control system. The electronic tag information on the shelf can be acquired by a fixed reader, which can realize the statistics of goods in and out, avoid manual statistics of goods one by one, and facilitate the positioning and inquiry of goods in stock. The electronic tag of goods includes the name of goods, the time of purchase and the quantity of goods in stock.

3) Reader equipment. Reader devices include fixed and hand-held devices, which use wireless communication and master computer to exchange data and information wholeheartedly.

4.2 Software Design of Logistics Distribution System Based on RFID

The core of logistics distribution system based on RFID is logistics distribution management unit, which is responsible for the management of all links and information in the process of logistics distribution, including distribution vehicles, route planning, order information and system. The software architecture of Logistics Distribution Management Unit is shown in Figure 6.
5. Conclusion

Logistics distribution system based on RFID can identify and track the information of the whole acquisition and supply chain. It can provide precise product distribution information for suppliers, manufacturers, retailers and consumers. This concurrent identification of goods electronic note information can greatly save time and reduce labor costs, simplify logistics distribution process and improve distribution efficiency. With the development of this automatic identification system, logistics distribution will be faster and more perfect.

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