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Construction of intelligent logistics system by RFID of Internet of things based on cloud computing

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ABSTRACT

The core of the Internet of things is the acquisition and transmission of information, extension and expansion of the client to any goods and goods between, the exchange of information and communication. Cloud computing refers to the use of mode of delivery and the IT infrastructure. The rapid development of Internet of things technology will greatly promote the modern logistics industry; promote the logistics industry to digital, integrated and intelligent. This paper presents construction of intelligent logistics system by RFID of Internet of things based on Cloud Computing.

Keywords: Cloud computing, Internet of things, RFID.

INTRODUCTION

The Internet of things is actually a concept of intelligent logistics. The Internet of things after the development of the industry is integrated logistics, integrated transportation, integrated storage industry, transportation industry, including shipping, maritime transport, land transport and so on, and production related manufacturing enterprises will benefit. In the new system of logistics, logistics efficiency, on the other hand, the quality of the products also increased, thus the production enterprise production and management standardization, commodities in circulation in order to safeguard the rights and interests of consumers, the system in operation.

The Internet of things is based on the Internet, through the RFID technology, infrared sensors, GPS, laser scanners and other information sensing equipment and technology, according to the agreed protocol, the reality of objects connected to the Internet to exchange information and communication, the network system to realize intelligent identification, location, tracking, monitoring and control the. The basic characteristics of the Internet of things are the overall perception, reliable transmission and intelligent control.

In this paper based on cloud computing platform, mainly by the boundary nodes (ES) and internal nodes (IS), in which nodes are distributed [1]. This feature determines the distributed system architecture should be a kind of inevitable choice, system structure based on cloud computing technology can maximize the advantages of distributed computing.

The park intelligent logistics system based on Internet of things technology, using advanced technology, RFID technology, sensor technology, information technology, computer technology, video technology, network technology, to realize the intelligent vehicle management, the park intelligent storage management, intelligent electronic scale management etc.

2. Application cloud computing in the Internet of things by RFID technology

Internet connection objects, to achieve the purpose of remote control, or between people and objects or objects and information exchange. The Internet of things industry application requirements and field is very wide, huge potential market. IOT industry will drive the synchronous development of microelectronics, sensors, video recognition system and a series of industry is still in the development at the same time, bring benefit production huge industrial clusters.

Warehouse management system design based on RFID technology is to achieve the purpose of article / storage control, storage location and quantity statistics, information query process automation, convenient management, query statistics and master the material flow, to achieve convenient, fast, safe, high efficiency requirements, as is shown by equation (1).

$$C(k) = \sigma^2_{s(k)} \beta(k) \beta(k)^T + \Sigma_{\varepsilon(k)} \tag{1}$$

RFID is dimensions in the Internet of things, get a higher level of integration planning. A number of provinces and cities nationwide have started the food network "cake" upgrade warfare; the Internet of things in the city in the development of information technology promotes the increasingly prominent role. An important technical support of RFID as the Internet of things, the development direction, the government gives money, platform and related support, also received a favorable environment for the development of it.

Application of RFID intelligent radio frequency identification technology, efficiency and effectiveness can help us improve our business in which different range or in the field, which is embodied in the following aspects: the retail area is a matter of a packet of sweets, or a refrigerator or DS machine, in the packaging printing standard bar code, is already a routine most of the steps in the process of industrial production in the commodity circulation enterprises, as is shown by equation (2) [2].

$$S^{''}(x_i) = M_{i-1} \frac{x_i - x}{h_i} + M_i \frac{x - x_{i-1}}{h_i} \tag{2}$$

RFID reader, power supply, reader antenna, induction coil, gate, infrared, camera, signal lamp, protective box and a mounting bracket, GPIO controller, the sound amplification equipment, the control host, vehicle detector.

The proposed heuristic algorithm is proposed according to the experience, the lack of a unified theoretical system, complete, the obtained solution only approximate optimal solution, similar to what extent, only according to the specific problems in order to give. The heuristic algorithm in the development process of over half a century, and brought some new ideas and algorithms, such as greedy algorithms, local search algorithm, genetic algorithm, simulated annealing algorithm, artificial neural network, evolutionary algorithm, as is shown by equation (3).

$$z_i(m,s) = \Psi_i(m,s) X(m) + \bar{v}_i(m,s) \tag{3}$$

The serial communication with the computer; non-contact RFID tag reads the information of goods, the accurate rate was 98%. Read and write distance up to 8m, the operating frequency: 900MHz, global Gen2 ISO18000-6C standard with EPC, comply with FCC regulations; read performance is reliable, can work in dense reader environment; tag data rates up to 640Kbps per second, 1000 labels; signal reception sensitivity -80dB; mainly used in aviation, highway, fashion, drugs, asset management, anti-counterfeiting, retail etc..

Electronic ticket information platform by using modern information transmission technology (the Internet, telecommunications network, CATV network formation, high speed interconnection) safety information network, a positive development and application of RFID system, global positioning system (GPS), geographic information system (GIS), wireless video and various logistics software, to build tourism group service cloud technology based on Internet of things technology application platform.

The RFID system for real-time tracking, warehouse staff only needs to use the RFID transceiver antenna and reader's help, you can put the information recording the incoming goods [3]. At the same time, RFID system can also according to the record label in the quantity of goods and the volume of information, indicating that the most appropriate storage location, in order to achieve the optimization storage space utilization. While in the process of goods inventory, can also through the automatic tracking RFID tags.

$$\mu_{j|i}(k-1) = \pi_{ji}\mu_j(k-1) / \sum_{j=1}^{n} \pi_{ji}\mu_j(k-1) \tag{4}$$

The application layer is the Internet of things development, software development, intelligent control technology will provide a IOT application of rich and colorful for the user, the development of various industries and family application will push Internet popularization of animal, but also to the entire Internet industry chain profits. View from the network architecture, based on the existing resources, core competitiveness operators network layer in this part of the material, not only to play their own advantages, and avoid being confined to the pipeline's role, operators should focus on the EPC middleware, a complex network middleware service provider.

3. Construction of intelligent logistics system in the Internet of things based on Cloud Computing

Radio frequency identification technology is a kind of using wireless radio tacit communication automatic identification technology [4]. RFID technology to mark items through RFID tags, by identifying items RF signal automatically and obtain relevant information, is one of the core technology of the Internet of things.

The RFID technology and the Internet, communication technology, has been applied in many fields of industrial automation, business automation, transportation, logistics, supply chain management, public information services, and gradually realize the global tracking and information sharing within the range, greatly enhance the management and operational efficiency, reduce the cost, as is shown by equation (5).

$$\sum h(n)h(n+2k) = \delta_{k,0} \tag{5}$$

In this paper, cloud computing makes use of the GPS, 3G, RFID global positioning technology, the Internet and other IT core technology, to transfer information in tourism industry Chinese pattern of traditional industries. The formal implementation of the project will provide a comprehensive, thoughtful modern tourism service outsourcing. RFID, instant messaging, GPS location data for organic docking, the current RFID information, GPS information through the instant communication tool, to the computer, mobile phone and other tourist groups and park hall TV screen, to realize real-time monitoring of scenic area scenic area management personnel, greatly accelerate the speed of information transmission and the effect of it.

The RFID system can guide and track transportation to the classification of the site, through the real-time collection of information goods, scheduling and allocation of transportation tool for effective work time. In addition, it can also help us to accomplish tasks such as: container inspection, check and confirm the container class, interior goods, as is shown by equation (6).

$$\begin{cases} \{X_1, \cdots, X_d\} = \arg\max J(X) \\ X_i^T X_j = 0,\ i \neq j,\ i, j = 1, \cdots, d \end{cases} \tag{6}$$

Intelligent logistics system includes the following: the design of simulation technology in logistics planning integrated (visualization of logistics planning and design of real-time tracking technology); logistics; network distributed storage management and inventory control; scheduling and optimization of logistics system; logistics basic data management platform and software integration technology.

Intelligent logistics system is presented in this paper including scheduling, bill management, carpool arrangement, departure confirmation management [5]. According to the transportation demand, automatic generation scheduling information system using the vehicle scheduling, and the scheduling plan refinement into each car's air waybill. Starting from the conservation of resources and energy point of view, may be automatic identification of vehicles, a car transfer Center system intelligent logistics system solutions technical instruction. The driver started the implementation of the transport task, the task for receiving information, transportation at the end of the mission to telephone the validation task information. Dynamic transport data transportation management system will be stored in the database, the convenience of analysis of historical data.

4. Simulation and Experiment

The physical world is one of the most important features of the Internet of things is the perception of reality, the sensor is supporting technology most important technology to realize the characteristics of, which determines the authenticity and accuracy of the original information [6]. The so-called sensor, according to the national standard GB7665-87, the sensor is able to feel to be measured, and according to certain rules to convert it into the device

usable output signal or installed.

This paper will be packaged products by the handling tool via the RFID reader and antenna composed of channel storage, the storage quantity and recorded in the system of automatic access to RFID devices, such as a pallet standard, each pallet cargo information reader into the tray standard through the purchase and export orders, while the formation of data association, and then through the computer storage management information system operation from the bit.

Inventory management inventory field intelligent, can help us to accurately monitor the flow of products, realize the real-time control of stock status, so as to improve the production of transparency and efficiency. Using RFID technology, we can through wireless information collection and storage of goods directly to complete the work.

EPC middleware system structure based on cloud computing, boundary node, the RFID reader for RF signal receiving RFID label, preliminary information processing, transfer to the corresponding internal node through the data transmission interface. The internal nodes by incident management system, task management system, interface module. Event management system is mainly used for receiving and processing the information obtained from the boundary node, and filtering to obtain the required data; task management system is responsible for the management of the superior middleware or enterprise application is sent to the middleware tasks, as is shown by figure1.

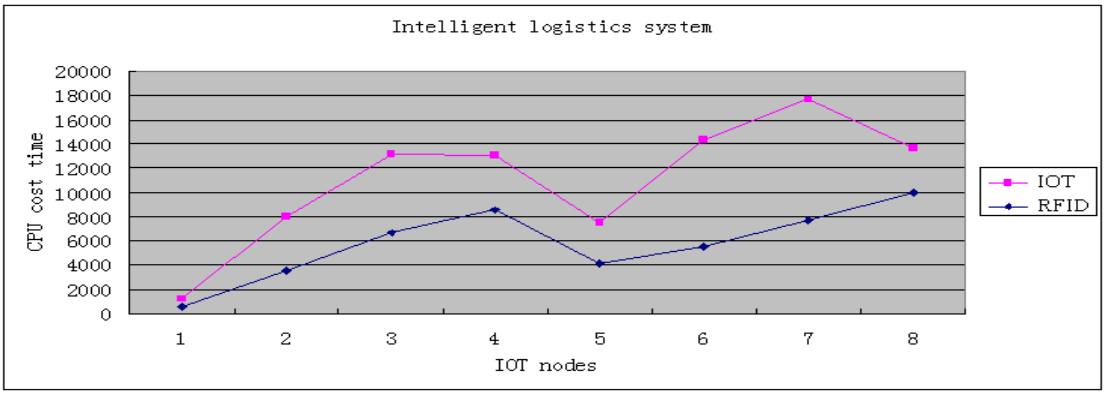

Fig. 1. Comparison results of intelligent logistics system by RFID of Internet of things with Cloud Computing

We use RFID technology to realize the automatic recording of vehicle access to the park's time, electronic scale time data. On the basic transportation information of vehicles, to cooperate with the warehouse management was ready for delivery or delivery. This vehicle positioning, including tracking of vehicles, to enter the park's time, electronic balance time, loading or unloading time, play time. Realize the positioning and tracking of vehicle location using RFID technology, to obtain the vehicle transport state. By tracking the supervision on the position of the vehicle, to cooperate with the warehouse management was ready for delivery or delivery.

CONCLUSION

Cloud computing and the Internet of things is the Internet, but the Internet of things is the application of cloud computing in a. The core of the Internet of things is the acquisition and transmission of information, extension and expansion of the client to any goods and goods between, the exchange of information and communication. Logistics intelligence is one of the important directions of the development of logistics industry. After the use of intelligent logistics system, logistics services can be extended upward to the electronic commerce, market research, industry forecasts etc; downward can extend to the logistics consulting, logistics planning, inventory control policy, payment and settlement, education and training, logistics system design etc.

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