A Study on Logistics Distribution Technology Based on Internet of Things

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***Abstract* — In this paper, the author studies logistics distribution technology based on Internet of things. The traditional logistics information system cannot achieve the delivery accuracy. Sometimes proposed cargo is accurate, but to the guest's hand goods may be wrong. The system development based on the platform of logistics information achieves the accurate results with good information aided by bar code scanning technology. It is very weak for the car temperature and humidity monitoring of the traditional logistics information system. The result shows that the performance of traditional logistic can be improved by using Internet of Things.**

Keywords - logistics distribution technology; performance evaluation; internet of things.

I. INTRODUCTION

At present, Global networking technology are developing rapidly. The Internet of Things is still in the difficult, setting standards and it promote the use of the primary stag. The Internet of Things increases the economic benefit, saves the cost, and it provides a technology support for world economic development. Our country also has formed complete Internet of things industry system, part of the field has begun to take shape. The prevalent is intelligent home furnishing, intelligent logistics, vehicle network, intelligent sensor, intelligent medical wisdom, wisdom, city security, environmental protection, intelligent microwave RFID and embedded tables and other equipment application technology. The real development related equipment and service of the Internet of Things is still in the initial stage. And Information technology, information technologies, information transmission technology, information processing technology and information security technology will be the Chinese Internet of Things key technological innovation projects [1-2].

Formerly, all kinds of logistics information technology can be competent for logistics information collected and disposed work, but can't support the real-time transmission of logistics information, leading to logistics companies can't timely and accurately grasp the relevant information of the goods and delivery man in logistics transmission chain, so as to reduce the logistics information system's overall operation efficiency [3]. Therefore, the system development based on the Android platform of logistics information has a positive role to improve logistics management. Logistics companies realize the communication with manufacturer and consumer through the intelligent terminal and sensor equipment at any time, the intelligent management of delivery men and warehouses, database management operation [4]. This kind of intelligent "through way" makes logistics companies quickly, accurately and fully understand the cargo information and delivery man delivery situation. That is to say mobile phone logistics system terminal has become the general trend of development of domestic and international logistics in the 21st century.

The logistics information system of Internet of Things based on the platform first design connecting to the server database, in order to delete add inquires operation, etc. Now the logistics companies often can't master the delivery specific conditions of delivery men, especially they can't accurately master the position information of delivery men. The system uses import Google Map so as to achieve the GPS satellite navigation and positioning, and it realized the delivery man position querying, online scheduling and distribution of the visualization and management in the process of inquiries [5-6]. The traditional logistics information system can't master the delivery accuracy. Sometimes proposed cargo is accurate, but to the guest's hand goods may be wrong. The system development based on the Android platform of logistics information achieves the accurate judgments of the good information cooperated with bar code scanning technology. It's very weak for the car temperature and humidity monitoring of the traditional logistics information system. It is very difficult to guarantee quality for some goods' temperature and humidity on the higher requirements.

In order to guarantee the quality of goods, it takes Zigbee agreement, sensor module so as to collect temperature and humidity data and allows the system to receive. Thus it realizes the logistics information system of intelligent operation. It overcomes the exiting system's low security, large energy consumption, and longtime delay [7]. The Android SQLite database encryption, the server's MYSQL database takes https database interaction, passwords and other sensitive information using SSL/TLS protocol and the certificate will lock. It uses Salt encrypted storage, the APK installation package signature defines its own custom permissions and other measures to ensure the logistics information system of Internet of Things based on the Android platform security. Through scientific established part table's index and transaction reduces the system's time delay and energy consumption, improves its integration [8].

II. THE FRAMEWORK OF INTERNET OF THINGS

As an important means of human intelligence in the future, the development of the Internet of things is paid more and more attention, and the Internet of things has the potential to be one of the new communication technologies. Along with the rapid development and maturation of electronic commerce, logistics based on the Internet of things can be more efficient and more intelligent, and it is also an important means and a trend to realize intelligent logistics. At the same time, the logistics based on the Internet of things has entered into the age of big data, traditional logistics information systems must solve the problems of storage and processing of the huge data, and deep the potential value of large data.

In the logistics information system based on the Internet of things, the Internet of things services the underlying hardware support, using the wireless sensor network to collect, upload data and receive the command by the sensor nodes, and then logistics information system stores and deals with the data from the sensors, tracking and monitoring logistics on real time. All above realized the connection of goods to goods, goods to transport vehicles and goods to people, to form intelligent logistics. The data generated by the intelligent logistics is one of the major sources of big data. Traditional logistics system only provides location information through order number, facing the challenge of intelligent logistics, it cannot realize tracking logistics goods with position and state (temperature, humidity, and etc.) on real time, to meet the need of users that get specific information of goods. And there is no special storage and processing for the logistics bid data. In this paper, the design and implementation of logistics information system based on the Internet of things, which is suitable for large data storage and processing, can realize real-time tracking of goods, such as the location and state, provides more detailed information of the goods to the user. The logistics system based on the Internet of things has five modules: user login, user registers, user info modify, order search of history and order search of not received, and the order search of not received include order info search, goods states search, goods location search and car info search. By the B/S framework, the system can realize the user remote login, register, modify personal information, views the personal history of orders and tracks the specific location of logistics goods, footprint, condition (temperature, humidity) and other functions.

Internet of things system mainly consists of three parts: perception control layer, the use of RFID, two-dimensional code, sensors perceive the object recognition. Network transport layer, the data layer is from the perception identification information via the Internet, TV network, and mobile communication networks and other infrastructure bearer network to the application service layer. Application service layer, using cloud computing, data mining and other intelligent computing technology to complete the object of intelligent control and management, and apply it to specific areas of the industry. Information exchange, the command transmission and architecture of the internet of things between the three parts. Figure 1 shows the concept diagram of Internet of Things.

Perception layer is mainly to identify objects and collect information from related objects, and the information processing to reduce data redundancy. The traditional logistics information system can't master the delivery accuracy. Sometimes proposed cargo is accurate, but to the guest's hand goods may be wrong. The system development based on the Android platform of logistics information achieves the accurate judgments of the good information cooperated with bar code scanning technology. It's very weak for the car temperature and humidity monitoring of the traditional logistics information system. It is very difficult to guarantee quality for some customers. Internet of things transport layer is the nerve center of the system, the information obtained by the perception layer send to the application layer to be processed applications. Application layer will eventually service to users, simple operation, enabling intelligent life. Figure 2 shows the basic structure and framework of Internet of Things.

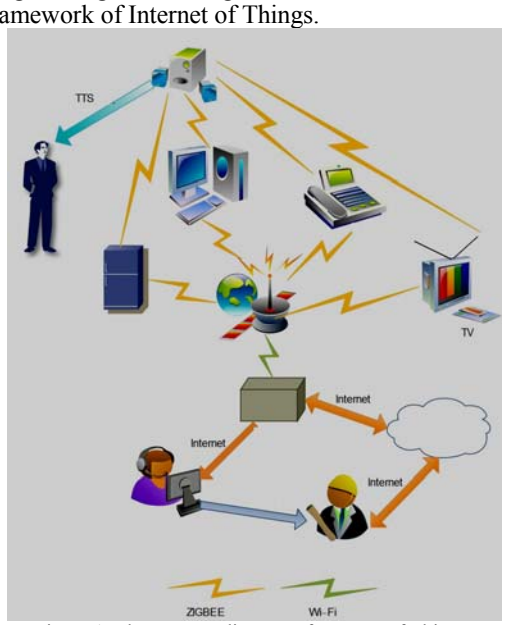

Figure 1. The concept diagram of Internet of Things.

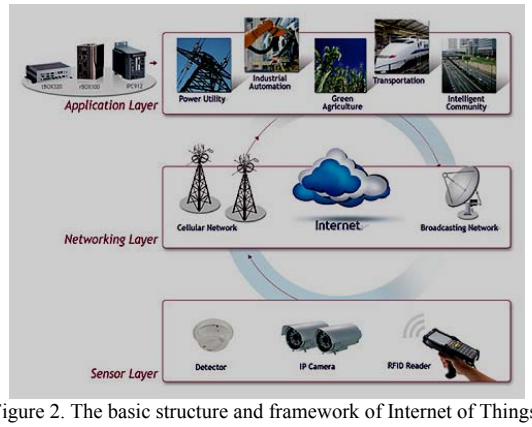

Figure 2. The basic structure and framework of Internet of Things.

Achieve automatic logistics spaces in the underground car park guidance system is an application of networking technology. Sensor devices installed at each logistics space logistics lot on logistics spaces for real-time collection are occupied by other information, and will be collected through the network data information to the data processing center. The information collection processing and analysis calculate the optimal route logistics and logistics optimal feedback to the user.

III. Results and Discussion

Through a comprehensive analysis of underground logistics system and user needs, underground logistics monitoring system based on internet of things technology should have the following features:

(1) Acquisition and display name logistics, area, location, traffic conditions near fees and billing methods, the surrounding traffic and other data transfer methods.

(2) Logistics managers need to understand the use of logistics spaces per vehicle entry / open a case, enter basic information about vehicle logistics, logistics reservation information, traffic information. Underground car parks are major convenience manager's logistics lot to maintain order and ensure safety of vehicle logistics, a timely change and adjust management strategies, improve operational efficiency.

(3) Every car logistics shall have a uniform means of identification (e.g. RFID tags), the owner of the information is correct logistics of vehicles, vehicle information, logistics information logo.

(4) A variety of information gathering nodes with data collection and transmission capabilities to facilitate installation and post-inspection, maintenance, data to be able to achieve rapid and effective treatment to ensure reliable access to information.

(5) To have a full range of monitoring systems, as well as real-time monitoring of environmental quality in a car park, and the logistics lot to the user managers to provide better service and work environment.

(6) To finally achieve cars and cars, people and cars, people and people contacted, user-friendly logistics and pick up the car, easy to manage scheduling managers to create better indoor logistics traffic order, to ensure safety.

The basic equation of key algorithm is shown as the equation (1):

$$(N, sk) \leftarrow Key(1^k) \tag{1}$$

This formula is used to generate file checksum parameter which is denoted by:

$$r \leftarrow \{0,1\}^k; sk \leftarrow \{e, d, r\};$$
$$Output\{N, sk\};$$

(2)

The Euler function is:

$$\phi(N) = (p-1)(q-1) \tag{3}$$

Then choose an integer e to satisfy the following equation 4:

$$\begin{cases} 1 < e < \phi(N) \\ \gcd(e, \phi(N)) = 1 \end{cases} \tag{4}$$

Then finally export (N, sk) in Tag algorithm, we can get the optimization equation (5):

$$(T_0, T_2, ...T_{n-1}) \leftarrow Tag(pk, sk, m) \tag{5}$$

The formula generates labels for each file block.

$$for(j = 0; j \le n-1; j++); \tag{6}$$

$$\{W_j = r * (j+1); T_i$$
$$= [h(W_j) * m_j]^c \bmod N\}; \tag{7}$$

$$Output(T_0, T_2, ...T_{n-1}); \tag{8}$$

And local fractional integral of $f(x)$ defined by Eq.9.

$$ {}_a I_b^{(\alpha)} f(t) = \frac{1}{\Gamma(1+\alpha)} \int_a^b f(t)(dt)^{\alpha}$$
$$= \frac{1}{\Gamma(1+\alpha)} \lim_{\Delta t \to 0} \sum_{j=0}^{j=N-1} f(t_j)(\Delta t_j)^{\alpha} \tag{9}$$

When designing the system to consider the practicality, fully meet user requirements for underground logistics system, consider the convenience of each part of the data acquisition and processing. Make the user's needs first, and to design user-friendly interactive interface, easy operation and simple implementation. With the use of networking technology system should be scalable, longer service life, stable and so on. When designing the system to fully consider the cost of implementing the time, while fully meet user demand to reduce as much as possible on the basis of funds, but also consider the future maintenance of the system convenient cost and other issues. Different from the outdoor logistics, underground logistics to take into account the lighting problem, it is necessary to ensure adequate lighting conditions also possible to save energy. In almost closed space will be poor people's sense of direction and even some users almost nothing, so the need to set a reasonable accurate indoor-oriented tips, to provide users with better service. The collected data will be centralized in the data monitoring center, so to ensure the security of user information does not leak. Underground logistics design will also be required to monitor the content of indoor air content of harmful gases whether is exceeded, the drainage system is in normal operating status.

According to the meaning of internet of things seen "material objects" connected, so included underground logistics system in every car should have an ID number be identified, it will be the key to the formation of the foundation and intelligent networking systems. Logistics

guidance system based on user needs, operational requirements and combines the key technologies of things, will be designed as shown in Figure 3 underground logistics intelligent monitoring system based on the framework of internet of things.

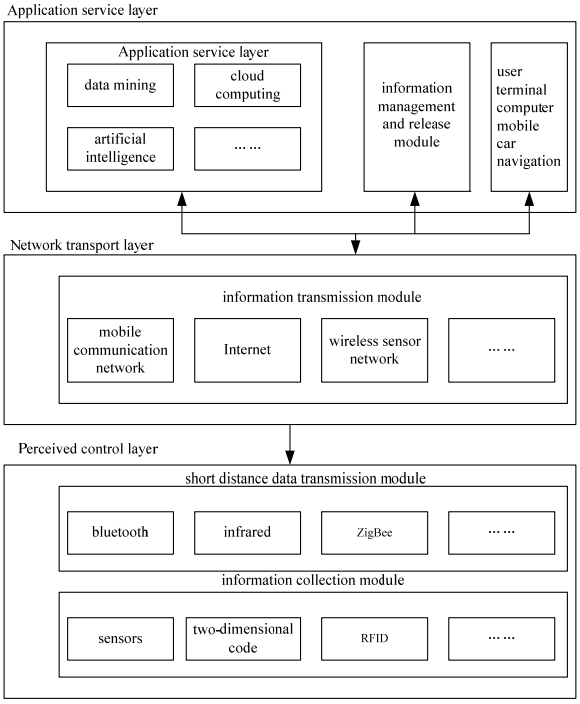

Figure 3. The underground logistics intelligent monitoring system based on the framework of internet of things.

The visual logistics system must base on a standard information disposal frame. Its aim is to realize the information share in all kinds of logistics states. A standard information disposal frame can be usually divided into two parts. One is the standard database frame. It fits the data transmission and exchange of every node in logistics information loop. The other is a standard frame for deal with data information. It fits the management demand among collaborative partners in logistics supply chain.

The standard flame of dealing with data information is an information exchange location in entire logistics information loop, which provides a visual dynamic data management environment. In which the data information from standard data frame are received and managed, the logistics events such as supplement, stock, distribution are handled, the report forms of state or query in logistics activity are formed. At the same time, the results in standard data mode are transferred to the standard frame.

The ultimate goal of logistics intelligent monitoring system is to provide logistics information and storage data into the monitoring center, and ultimately to the user and logistics management. The system needs to have the number of information processing and memory functions, because the system requires accurate real-time logistics information collection vehicle, and then sent to the logistics users. However, the collected information cannot be immediately used as the basis for guiding the vehicle stopping, so the system must have a data processing and storage capabilities, analysis of the data after the processing into useful information to the user. Acquisition and sending information transmission channels are required, so the system must also have transfer functions. If the underground logistics system considered logistics in advance reservation function, the relationship between the various modules of the system shown in Figure 4.

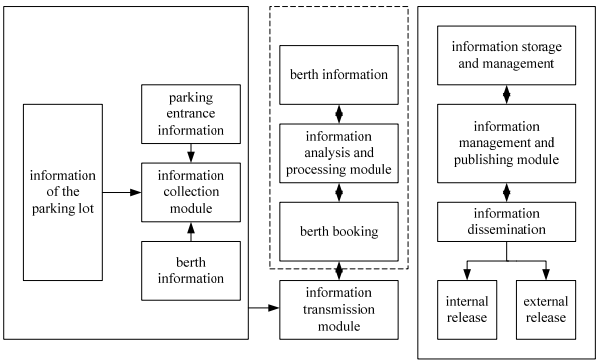

Figure 4. The diagram of System module.

The information collection function of the system is in the lowermost layer, which is at the origin of all data. It collects and storage the data for a short period of time. Through the RF identification technology, the sensor, video monitoring is equipped for the basic characteristics of the vehicle information, such as whether the logistics free information, etc. The collected data is sent to the network via the WSN transport layer, and then data is processed and analyzed. Based on data collection module of internet of things need to have real-time accurate sailed out into the logistics lot of vehicles and the use of the logistics spaces, logistics lot at the entrance of the traffic conditions.

Information transmission function must be able to ensure timely and accurately transfer the data collected in order to achieve the interaction between the collection and processing of information, interactive data processing results between users. Currently, the data transmission technology includes wired transmission and wireless transmission. The user can select the transmission mode according to the actual situation (geographical environment, transmission distance, construction costs and other factors). As we all know, the distance between the logistics spaces in the car park is relatively short, in order to eventually achieve cars and cars, people and people accurate transmission of information, these can use WSN technology. Because WSN technology can process large amounts of information, and has the ability to install a large number of sensor nodes in a fault-tolerant system would enhance the coverage more extensive, to improve the monitoring capacity of the system to a large extent.

Information analysis and processing function makes the collected information converted into voice or image or text

form, then sent to the user to achieve the ultimate goal of intelligent monitoring. Many types of objects in the system of internet of things, information transmission "substance and substance" between the need to be pre-pretreatment, so the data need to deal with a lot of this module, a very large amount of computation. To build only the data processing system must first solve the problem of the system. Underground logistics system based on internet of things needs the support of cloud computing technology, analytical instruments as limited internet terminal, computing storage capacity is limited, long-term use will cause inconvenience to the entire system.

IV. CONCLUSION

In this paper, the author studies on the logistics distribution technology based on Internet of things. The traditional logistics information system can't master the delivery accuracy. Sometimes proposed cargo is accurate, but to the guest's hand goods may be wrong. The traditional logistics information system can't master the delivery accuracy. Sometimes proposed cargo is accurate, but to the guest's hand goods may be wrong. The system development based on the Android platform of logistics information achieves the accurate judgments of the good information cooperated with bar code scanning technology. It's very weak for the car temperature and humidity monitoring of the traditional logistics information system. It is very difficult to guarantee quality for some customers. Internet of things transport layer is the nerve center of the system, the information obtained by the perception layer send to the application layer to be processed applications. The result shows that the performance of traditional logistic can be improved by using Internet of Things.

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