중국의 RFID 기술과 응용에 대한 고찰

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A study on RFID technology and application of China

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요 약

이 논문에서는 GPS 신호 캡처 원리에 대한 연구를 기초로 하여 Matlab에서 GPS 신호캡처의 과정을 시뮬레이션, 실현하고 분석하였다. 소프트웨어 GPS(SGR) 수신기를 이용하여 위성항법장치 안테나 GPS의 원시 신호 데이터의 가장 낮은 수준을 처리할 수 있다. 시뮬레이션의 결과는 이러한 방법의 정확성, 가능성을 증명하였으며 시뮬레이션 플랫폼 GPS 신호의 실제 환경 연구에 근거하여 위성수신 장치의 성능을 높이는데 중요한 실용적인 의미가 있다.

ABSTRACT

RFID is the item is at the core of the Internet, promoting action in the online community is a pivotal element. RFID uses radio frequency waves to automatically find the technology to track individuals and items referring to the short-range wireless technology can be included. For example, ZigBee and Bluetooth has a strong ability to track and calculate. In this study, major advances in this technology by analyzing the techniques of intensive discussions, the current progress of mankind, and the impact on the future direction of development is included.

키워드

Ⅰ. Introduction

Mark Weiser 10 years ago that lays out a picture of the world, in this world, the technology into people′s daily life, that is not perceived by the people. He believes the technology will be invisible most of the major, he is ubiquitous computing era messenger of spring. [1]

However, the real barrier to make information and communication into our surrounding environ-ment, the transfer of computing model should exponentially increase with the network devices together. Transfer means that the intelligent computer model will be as common as writing.

But if not only the people, and all of the items can be linked together, can actually come into contact with all the consumer will be a tiny radio transmitter can be used or embedded hyperlink tag tracking. These labels will eventually change the product distribution, sales and procurement methods,

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and perhaps eventually will follow the people and understand their communication.

Ⅱ. RFID Technology

This chapter of the radio frequency identification (RFID), were reviewed and discussed the technology standards.

2.1 RFID origin

In 1840, Faraday discovered electromagnetic energy. The 19th century, the establishment of the Maxwell theory of electromagnetic radiation propagation. Early 20th century, mankind has been able to use the radio waves. Appeared in the 20th century, the radar 20 years. This technique is detected by the reflection of radio waves and targeted. [2]

With radio technology and radar technology, RFID technology 50 years in the 20th century has been further developed. 60 years of the 20th century, began to be used for radio frequency identification and monitoring of nuclear and other hazardous substances.

20th century, 70's and 80's, researchers, inventors, companies, universities and government agencies active in the laboratory of RFID, in this period, RFID work has been rapid development. Technology development goal is to reduce the cost and size of RFID, as well as power and communication distance. Then appeared in a variety of technical standards and new applications (such as athletes management), making the technology of everyday life has gradually become an integral part. The biggest advantage of RFID is not easily damaged, without interference. [3]

2.2 RFID to Work

Simply put, RFID is to use electromagnetic radiation to identify a person or an object means.

Commonly used frequency is 125KHz (Low Frequency), 13.56MHz (HF), or 800~960MHz (UHF). RFID can automatically capture products, time, location and transaction information. A RFID system consists of two main parts:

1. carrying the data transmitter (such as labels), which is located above the target to be determined, generally consists of two components (such as coil or microwave antenna) and an electronic chip.

2. read the launch of data receiver (or reader), such as wall mounted or embedded in a device, whether it is read-only or read / write, called reader.

Many readers have additional interface, the received data can be transmitted to another system, such as personal computers and robot control system. Better than a grain of sand a large majority of labels (ie width of less than 3mm), usually within a sealed glass or plastic modules. Compared with the tags, readers, the larger, more expensive, more energy. In most systems, the reader transmitting a low-power radio frequency signal, activation tagging (when tag reader again, and it has its own antenna.) Then, selectively labels the energy / data reflected back to the reader (It was at this time is the receiver), informed of their identity and other relevant information. Most of the label only in the reader's coverage area will be activated, beyond it, the label is in hibernation. Reader can be attached to a computer database containing relevant, this database can be with the company's internal network is connected, it can be connected to the global Internet.

RFID and traditional bar codes are very important and fundamental difference. First, the traditional bar code is only expressed in the product category. For example, all of the Gillette razor blade speed 3 have the same bar code. The RFID tags can be the characteristics of each package inserts are sent to the appropriate

oversight reader. Currently, the Electronic Product Code (EPC) RFID tags are tracking the data items the main criteria. EPC contains more data than bar codes, in a sense, it is a tiny embedded object database. Second, RFID data collection do not need wires, which is better than another feature of the bar code. This means that by identifying and tracking, in fact no longer need to physically approach to handle a large number of personal items. This is the bar code can not be done, bar code scanner must be inserted to identify. Some RFID tag reading distance of 0.15-0.2 m, but most of the RFID tag read distance of 1 meter, a relatively new UHF tag reading distance and even up to 6-7.5 meters. [4]

2.3 Types of RFID

RFID systems are generally classified according to the function of data transmission. Transmitter power for the label used is divided into active and passive type type.

1. passive-type tag: This tag does not require batteries or electricity. Tag using radio frequency waves of energy, which is the cheapest, most widely used label.

2. semi-passive tag: This tag is equipped with an internal battery, according to communications from the power supply, so the labels to play better. Communication to internal battery power supply circuit, not to produce radio waves.

3, active tags: These tags entirely on battery-powered, so even without the RFID reader can also generate radio waves.

2.4 RFID and RF spectrum

RFID systems can be classified frequency of their work. While countries often require the use of different, but governments have been efforts to coordinate the frequency RFID segment. In most countries, RFID system uses low frequency points (LF), high frequency (HF) and ultra-high frequency (UHF) three bands.

Typical applications include low-frequency access control, animal tracking, automobile manufacturing, health care applications, certification and retail. Typical applications include smart cards and high-frequency shelf item tracking, library tracking, patient monitoring, product certification and air cargo tracking. UHF RFID for sales and logistics. Especially for UHF RFID in supply chain management, because of its large amount of data transmitted. UHF is also widely used in highway toll systems, manufacturing and car park access control.

In Japan, with UHF RFID tracking tags to be resisted for several years, because this band has been assigned to the mobile phones, taxis and trucks, communication systems, and disaster prevention and public wireless networks. But then, South Korea MIC (Ministry of Information and Communication) opened the 950-956MHz frequency band of the RFID experiment. The Standardization Administration of China announced in 2004, has set up a RFID tag standards working group, the task is the development of Chinese standards.

On the promotion of UHF RFID is vital, because this band is likely to widen the supply chain goods tracking the reading distance. Given the growing importance of RFID, Governments and international organizations are working to narrow the differences between countries, to ensure there is enough band RFID applications.

III. Commercial application of RFID

This section describes a number of key RFID business applications, such as transportation, logistics, access control, medicine, manufacturing and agriculture.

3.1 Transport and Logistics

RFID public transport and traffic is one of the most widely used areas. RFID was first used on the road charges. As time-consuming, access cards, and installed in the automatic toll collection machine and the ticket is too expensive vehicles, public transport companies have been suffering. Use of RFID electronic toll management system can reduce transportation costs of the company's management to increase the commuter ticket holding passenger traffic. In general, these systems are using a non-contact smart card, up to 10 years of its life, and not susceptible to the liquid, dust and damage caused by temperature changes.

In addition to public transport, the packages and mail transport is also to start using RFID by. The technology transfer in the positioning of goods and information necessary to connect wires. Thus, a large number of personal letters and parcels handled without physical contact and can mail out.

Hong Kong International Airport is the busiest airport in the world, with annual passenger traffic to 35 million, the Hong Kong International Airport announced the installation of RFID baggage handling facilities reader. All aspects of the airport, including baggage conveyors, storage, the system will be installed to read, they have the ability of the RFID baggage tag read / write. RFID handheld reader may be used to handle moving luggage.

3.2 Security and access treatment

RFID is increasingly used to control access to restricted areas, improve laboratories, schools, airports and other places of safety. Many have been using employee identification card, RFID, as the office of the pass.

RFID is also used to monitor the education sector the number of students. November 2003, China began to use RFID to prevent fraud. Chinese Ministry of Railways and Ministry of Education is facing problems identifying the authenticity of student card, to prevent non-students to purchase student tickets. 2003 of the Ministry of Education issued 10 million smart labels and micro-chips, each chip contains 2kbit data can be read at a distance of 1.5 meters. Chips are now stored as data of students, the future will include diploma and degree information.

3.3 Medical Applications

Pharmaceutical industry is an important area of RFID applications, RFID can be fully automated to pass the information on the bed, thus reducing human error and improve efficiency. And secure wireless networks, such as wireless LAN connection, embedded drugs and patients can quickly tag bracelet in to access electronic patient records and other information.

In short, RFID application in patient care is very important, medicine and electronic products on the label protect against fake drugs, increase sales, reduce prescription errors and reduce returns. RFID can also play a role in medical rehabilitation, such as the production of dentures and crowns.

3.4 Manufacturing and processing

Manufacturing and processing industry on computer controls and information technology has become increasingly dependent. With RFID tags, in some cases coupled with the sensors and exciters, to fully factory and laboratory work to improve the accuracy and efficiency.

3.5 Agriculture

RFID for the greenhouse is much better than traditional bar codes. To scan the bar code must be clean and dry, while RFID tags are not afraid of water, not afraid of dust, can read data more quickly. Installed in the greenhouse beds, and with RFID sensors can track the antenna crops, precision grasp output.

IV. Development of RFID in China

Beginning of this century, RFID has already begun in China, the application of exploratory and soon received strong government support, June 2006, China issued a "White Paper on RFID technology policy", marked the development of RFID has been increased to the national industrial the development of the strategic level. In the next 5-10 years will maintain rapid development. [5]

Currently, RFID in China, has been applied in many areas, but in terms of our daily life experience, it seems very far away from us, or RFID. In addition to second-generation ID card, we often feel that RFID is difficult in our lives there. This in the end is why? Actually, it is very simple, even though RFID is rapidly been applied in various fields, but the relative economic size of our country, and its wide range of applications not yet reached the extent of RFID applications even in the relatively large number of transport and logistics industry, but also still in the point distribution of the state, the state failed to meet the plane. Since the economic crisis, many of the RFID industry have begun to cast doubt on the future development of the industry and disappointment, then in the end what factors hinder this emerging industry in China's development?

First, the general information of enterprise level is not high, hindering the RFID fully play its role. RFID as a means of information technology, its basic function is to achieve rapid collection of data precision. The data collected, it must be analyzed further processing in order to achieve greater efficiency and lower overall cost effect. In other words, RFID implementation, it often requires a certain level of enterprise information, so that existing RFID systems and enterprise ERP, CRM integrated with other information in order to fully play its role.

Second, RFID implementation costs are still relatively high, prohibitive for many companies. Not only for Chinese companies, even for western companies, RFID's high cost is a huge obstacle. In China, a RFID tag is generally more than the 1 yuan, ETC on-board unit to 400 yuan, making high-cost RFID has a great return on investment risk and make the most of limited high-value or high-margin area of commodities.

Third, the industry standard has not yet unified, would be implemented will bring about uncertain risks. Despite the early origins of RFID, but there are no technical standards for a global unified China in the field of standards development started late, in this case, the rash investment, will inevitably bring significant business risks. Blu-ray DVD standards battle to obtain the victory, giving HD-DVD camp, enormous damage is in dispute industry standard in the enterprise had to carefully consider.

Finally, our supply chain development is still in its infancy, but also hindered the practical application of RFID. Compared with Western companies, due to technical and management at a disadvantage, the existence of excessive competition in most industries, price becomes the primary means of market competition, which led many manufacturers to maintain profit margins in the very low levels, the industry supply chain downstream co-operation between enterprises are often greater than the game. The RFID technology is only in the implementation of the entire supply chain collaboration, supply chain transparency and sharing of information in order to maximize the role of RFID, which is also very difficult to achieve under the present circumstances. [6]

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Finally, from the industrial supply chain perspective, the countries are to promote industrial upgrading, is to enable Chinese companies to produce more high-tech, high value-added, high margin products, and these areas, it is RFID arena. Industrial upgrading will lead to enhance the market competitiveness of Chinese enterprises, and gradually increased by a single enterprise competition for the industry supply chain competition. In the next few years, we will see, RFID will be implemented only by the individual enterprises out of the dilemma, and show for the enterprise lies the implementation of the whole supply chain collaboration, RFID's benefits will be greatest degree of play.[8]

V. Conclusions

Although the degree of information of Chinese enterprises is still relatively low at present, but the pace of Chinese enterprises fairly quickly. This year, China has entered more than 40 Fortune 500 companies, more domestic companies are rapidly growing multinational enterprises, the increasingly complex management requirements of these enterprises must rapidly advancing information technology, Chinese companies at this point after a certain advantage, and corporate information are bound to bring good opportunities for the development RFID. With the process of enterprise information, RFID applications will be from point to plane, and gradually extended to wider areas. The cost of RFID implementation, RFID applications with the necessity to promote and expand the market gradually reduced. All these, we do not doubt the development of RFID in China.

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