

Design of ZIG BEE PRO Based Wireless order system for dishes using ARM

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Abstract-- Currently, the traditional manual method played a dominant position in Catering services, this approach requires a large number of service staff and service personnel, which increased service costs, therefore, this paper give a method to improve the Order System for Dishes by ZigBee technology, to cut the cost and save human resources. In this paper, ZigBee wireless communication technology as a tool is designed in the system. The System realized the goals such as low cost, low consumption, and high automation. The monitoring production in enterprises by humans on site are unable to meet the expectations for efficiency, accuracy and cost as product lifecycles are shortened continuously. Setting up an RFID and ZigBee based manufacturing monitoring system is a good approach to improve monitoring efficiency so as to improve management efficiency in enterprises. Although there are still some problems to be solved for RFID and ZigBee technologies, their unique features still make the monitoring system based on them a promising system in manufacturing enterprises.

Keywords-ZigBee technology, RFID, RFID Mandates

INTRODUCTION:

Currently, the traditional manual method played a dominant position in Catering services, this approach requires a large number of service staff and service personnel, which increased service costs, therefore, this paper give a method to improve the Order System for Dishes by ZigBee technology, to cut the cost and save human resources. In this paper, ZigBee wireless communication technology as a tool is designed in the system. The System realized the goals such as low cost, low consumption, and high automation. There are some successful cases by using RFID and ZigBee based wireless sensor monitoring systems. According to the retail analyst from the company of Sanford C. Bernstein, Wal-Mart can save 8.35 billion dollars per year owing to RFID. Most of the money is saved because there is no need for workers to check the bar code any more. There is no doubt that RFID is helpful in solving the two difficulties in retail business: one is being out of stock due to supply chain disturbed, and the other is the loss of the products due to thefts. Just because of the theft, wal-Mart has a loss about 2 billion dollars every year. It is estimated by a research institution that the RFID technology will decrease the theft loss by 25 percent.

Radio-frequency identification (RFID) : The use of a wireless non-contact system that uses radio-frequency

electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies). The tag contains electronically stored information which can be read from up to several meters (yards) away. Unlike a bar code, the tag does not need to be within line of sight of the reader and may be embedded in the tracked object. RFID tags are used in many industries. An RFID tag attached to an automobile during production can be used to track its progress through the assembly line. Pharmaceuticals can be tracked through warehouses. Livestock and pets may have tags injected, allowing positive identification of the animal.

RFID monitoring devices can serve as the data collection system and the ZigBee wireless network can serve as the communication system to transmit the data to different levels of the enterprise management. the perspective of system automatic control, the RFID and ZigBee monitoring system serves as the feedback link so as to achieve the close-loop control and management of the enterprise.

ZigBee is a technology of following protocol. Low complexity, low cost, low power consumption low transmitting rate, high reliability, wireless short distance transmission, and being capable of ad-hoc networks are all its features. It is suitable for the fields of automatic control and remote control, and it can be embedded in many different devices. In short, ZigBee is a wireless ad-hoc network capable communication technology which is cheap and low power consumption.

Design:

A radio-frequency identification system uses *tags*, or *labels* attached to the objects to be identified. Two-way radio transmitter-receivers called *interrogators* or *readers* send a signal to the tag and read its response. The readers generally transmit their observations to a computer system running RFID software or RFID middleware.

The tag's information is stored electronically in a non-volatile memory. The RFID tag includes a small RF transmitter and receiver. An RFID reader transmits an encoded radio signal to interrogate the tag. The tag receives the message and responds with its identification information. This may be only

a unique tag serial number, or may be product-related information such as a stock number, lot or batch number, production date, or other specific information.

RFID tags can be either passive, active or battery assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery assisted passive (BAP) has a small battery on board and is activated when in the presence of a RFID reader. A passive tag is cheaper and smaller because it has no battery. Instead, the tag uses the radio energy transmitted by the reader as its energy source. The interrogator must be close for RF field to be strong enough to transfer sufficient power to the tag. Since tags have individual serial numbers, the RFID system design can discriminate several tags that might be within the range of the RFID reader and read them simultaneously.

Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user. Field programmable tags may be write-once, read-multiple; "blank" tags may be written with an electronic product code by the user.

RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal.

Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for when tags go in and out of the interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

USES:

The RFID tag can be affixed to an object and used to track and manage inventory, assets, people, etc. For example, it can be affixed to cars, computer equipment, books, mobile phones, etc.

RFID offers advantages over manual systems or use of bar codes. The tag can be read if passed near a reader, even if it is covered by the object or not visible. The tag can be read inside a case, carton, box or other container, and unlike barcodes, RFID tags can be read hundreds at a time. Bar codes can only be read one at a time.

In 2011, the cost of passive tags started at US\$0.05 each; special tags, meant to be mounted on metal or withstand gamma sterilization, can go up to US\$5. Active tags for tracking containers, medical assets, or monitoring environmental conditions in data centers start at US\$50 and can go up over US\$100 each. Battery Assisted Passive (BAP) tags are in the US\$3–10 range and also have sensor capability like temperature and humidity.

RFID can be used in a variety of applications, such as:

- Access management
- Tracking of goods
- Tracking of persons and animals
- Toll collection and contactless payment
- Machine readable travel documents

- Smartdust (for massively distributed sensor networks)
- Tracking sports memorabilia to verify authenticity
- Airport baggage tracking logistics

In 2010 three key factors drove a significant increase in RFID usage: decreased cost of equipment and tags, increased performance to a reliability of 99.9% and a stable international standard around UHF passive RFID. The adoption of these standards were driven by EPCglobal, a joint venture between GS1 and GS1 US, which were responsible for driving global adoption of the barcode in the 1970s and 1980s. The EPCglobal Network was developed by the Auto-ID Center, an academic research project headquartered at the Massachusetts Institute of Technology (MIT) with labs at five leading research universities around the globe: Cambridge, Adelaide, Keio, Shanghai, Fudan, St. Gallen. At RFID Journal Live 2010 in Orlando, Airbus detailed 16 active projects, IBM and—most recently added to the team—CSC. The two other areas of significant use are financial services for IT asset tracking and healthcare. RFID is becoming increasingly prevalent as the price of the technology decreases.

Payment by mobile phones:

Since summer 2009, two credit card companies have been working with Dallas, Texas-based DeviceFidelity to develop specialized microSD cards. When inserted into a mobile phone, the microSD card can be both a passive tag and an RFID reader. After inserting the microSD, a user's phone can be linked to bank accounts and used in mobile payment.

Dairy Queen in conjunction with Vivotech has also begun using RFIDs on mobile phones as part of their new loyalty and rewards program. Patrons can ask to receive an RFID tag to place on their phone. After activation, the phone can receive promotions and coupons, which can be read by ViVotech's specialized NFC devices.

Similarly, 7-Eleven has been working alongside MasterCard to promote a new touch-free payment system. Those joining the trial are given a complimentary Nokia 3220 cell phone – after activation, it can be used as an RFID-capable MasterCard credit card at any of 7-Eleven's worldwide chains.

Nokia's 2008 device, the 6212, has RFID capabilities also. Credit card information can be stored, and bank accounts can be directly accessed using the enabled handset. The phone, if used as a vector for mobile payment, has added security in that users would be required to enter a passcode or PIN before payment is authorized.

Infrastructure management and protection:

At least one company has introduced RFID technology to identify and locate underground infrastructure assets such as gas pipelines, sewer lines, electrical cables, communication cables, etc.

The first RFID passports ("E-passport") were issued by Malaysia in 1998. In addition to information also contained on the visual data page of the passport, Malaysian e-passports record the travel history (time, date, and place) of entries and exits from the country.

Standards for RFID passports are determined by the International Civil Aviation Organization (ICAO), and are contained in ICAO Document 9303, Part 1, Volumes 1 and 2 (6th edition, 2006). ICAO refers to the ISO/IEC 14443 RFID chips in e-passports as "contactless integrated circuits". ICAO standards provide for e-passports to be identifiable by a standard e-passport logo on the front cover.

Since 2006, RFID tags included in new US passports will store the same information that is printed within the passport and also include a digital picture of the owner. The US State Department initially stated the chips could only be read from a distance of 10 cm (4 in), but after widespread criticism and a clear demonstration that special equipment can read the test passports from 10 meters (33 ft) away^[citation needed], the passports were designed to incorporate a thin metal lining to make it more difficult for unauthorized readers to "skim" information when the passport is closed. The department will also implement Basic Access Control (BAC), which functions as a Personal Identification Number (PIN) in the form of characters printed on the passport data page. Before a passport's tag can be read, this PIN must be entered into an RFID reader. The BAC also enables the encryption of any communication between the chip and interrogator.

TRANSPORTATION PAYMENTS

In many countries, RFID tags can be used to pay for mass transit fares on bus, trains, or subways, or to collect tolls on highways.

Some bike lockers are operated with RFID cards assigned to individual users. A prepaid card is required to open or enter a facility or locker and is used to track and charge based on how long the bike is parked.

The Zipcar car-sharing service uses RFID cards for locking and unlocking cars and for member identification.

In Singapore, RFID replaces paper Season Parking Ticket (SPT).

Identification



A sheep with an ear tag.



Animal management using RFID technology. Santa Gertrudis cattle: The calf has an electronic ear tag and herd management tag (yellow).

RFID tags for animals represent one of the oldest uses of RFID technology. Originally meant for large ranches and rough terrain, since the outbreak of mad-cow disease, RFID has become crucial in animal identification management. An implantable RFID tag or transponder can also be used for animal identification. The transponders are more well-known as passive RFID technology, or "chips" on animals.^[46] The Canadian Cattle Identification Agency began using RFID tags as a replacement for barcode tags. Currently CCIA tags are used in Wisconsin and by US farmers on a voluntary basis. The USDA is currently developing its own program.

Implantable RFID chips designed for animal tagging are now being used in humans. An early experiment with RFID implants was conducted by British professor of cybernetics Kevin Warwick, who implanted a chip in his arm in 1998. In 2004 Conrad Chase offered implanted chips in his night clubs in Barcelona^[47] and Rotterdam to identify their VIP customers, who in turn use it to pay for drinks.

RFID mandates:

Wal-Mart and the United States Department of Defense have published requirements that their vendors place RFID tags on all shipments to improve supply chain management. Due to the size of these two organizations, their RFID mandates impact thousands of companies worldwide. The deadlines have been extended several times because many vendors face significant difficulties implementing RFID systems. In practice, the successful read rates currently run only 80%, due to radio wave attenuation caused by the products and packaging. In time it is expected that even small companies will be able to place RFID tags on their outbound shipments.

In January 2005, Wal-Mart required its top 100 suppliers to apply RFID labels to all shipments. To meet this requirement, vendors use RFID printer/encoders to label cases and pallets that require EPC tags for Wal-Mart. These smart labels are produced by embedding RFID inlays inside the label material, and then printing bar code and other visible information on the surface of the label.

In October 2005 the University of Arkansas' Information Technology Research Institute released a report on its preliminary study of the impact of RFID on reducing retail out-of-stocks and concluded that RFID reduced out of stocks (OOS) by 21% over non-RFID based stores.

Two years later the Wall Street Journal published an article titled "Wal-Mart's Radio-Tracked Inventory Hits Static." The articles stated that the RFID plan set forth by Wal-Mart was "showing signs of fizzling" due to a lack of progress by Wal-Mart executives to introduce the technology to its stores and to the lack of incentives for suppliers.

ZigBee is a specification for a suite of high level communication protocols using small, low-power digital radios based on an IEEE 802 standard for personal area networks. ZigBee devices are often used in mesh network form to transmit data over longer distances, passing data through intermediate devices to reach more distance ones. This allows ZigBee networks to be formed ad-hoc, with no centralized control or high-power transmitter/receiver able to

reach all of the devices. Any ZigBee device can be tasked with running the network.

ZigBee is targeted at applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth.

CONCLUSIONS

The system has greatly enhanced the restaurant's management system, make the management model digital, intelligent, while increasing the transparency of management and improving the management model. The RFID and ZigBee based manufacturing monitoring system is promising in the manufacturing enterprises in general. We have developed a prototype system of the RFID and ZigBee based monitoring system, which shows good performance in the experimental environment. As a system, its advantages are very obvious compared with other technology.

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