RFID Technology for Parking

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ABSTRACT

Radio Frequency Identification (RFID) tags, like bar codes, are used to identify individual vehicles, CDs, DVDs and other circulating items. RFID tags can contain more information than a bar code, which is limited to a single sequence of numbers. RFID tags communicate via radio signals, whereas bar codes operate optically. Bar codes require a reader to be held up to the bar code tag -- line-of-sight. Whereas an RFID tag does not require line-of-sight. If the reader is close enough to the item, the RFID tag.

The literature has indicated that parking in developed countries are fast growing early adopters of Radio Frequency Identification (RFID) technology. The other sector of early adopters is distributors who use the technology primarily in the supply chain.

The literature abounds with studies on perceived and expected problems with RFID in the supply chain but is sparse on performance and reliability of the technology in parking environments. This has prompted researchers to suggest that there is a need for investigation of RFID in parking environments. The study will measure performance of RFID parking system at a university parking by examining factors, namely tag placement, reader orientation sensitivity, read rate, reading distance, and metal and electromagnetic interference. Test procedures will be created to record accuracy rate, which will be further analyzed with a spectrum analyzer to understand the behavior of RFID tag reader communication in the parking environment .

1. DIFFERENCE BETWEEN BARCODE & RFID:

One of the key differences between RFID and bar code technology is RFID eliminates the need for line-of-sight reading that bar coding depends on. Also, RFID scanning can be done at greater distances than bar code scanning. High frequency RFID systems ***(850*** MHz to 950 MHz and 2.4 GHz to 2.5 GHz) offer transmission ranges of more than 90 feet, although wavelengths in the 2.4 GHz range are absorbed by water (the human body) and therefore has limitations.

To create the data base MS-ACESS is used which is powerful tool. To support this Visual Basics is used as front end support which is best solution for the parking system.

2. SIX SENTENCES ABOUT RFID FOR PARKING

1. RFID tags replace both the EM security strips and barcode.
2. Simplify patron self check-out / check-in.
3. Ability to handle material without exception for video and audio tapes.
4. Radio Frequency anti-theft detection is innovative and safe.
5. High-speed inventory and identify items which are out of proper order.
6. Long-term development guarantee when using Open Stand

3. RFID TECHNOLOGY FOR PARKING

RFID (Radio Frequency Identification) is the latest technology to be used in parking theft detection systems. Unlike EM (Electro-Mechanical) and RF (Radio Frequency) systems, which have been used in parking for decades, RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the parking, including easier and faster charge and discharge, inventorying, and materials handling. RFID is a combination of radio-frequency-based technology and microchip technology. The information contained on microchips in the tags affixed to parking materials is read using radio frequency technology regardless of item orientation or alignment (i.e., the technology does not require line-of-sight or a fixed plane to read tags as do traditional theft detection systems) and distance from the item is not a critical factor except in the case of extra-wide exit gates. The corridors at the building exit(s) can be as wide as four feet because the tags can be read at a distance of up to two feet by each of two parallel exit sensors. The targets used in RFID systems can replace both EM or RF theft detection targets and barcodes.

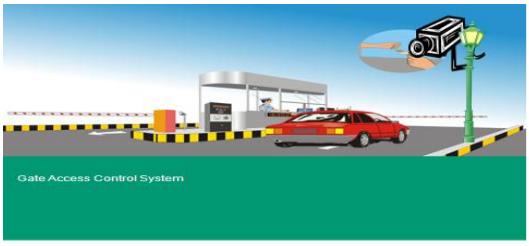

Fig 1. RFID technology for parking

3.1. How Parking RFID Systems Work

An RFID system consists of tags, readers, programming stations and the various interfaces involved in communicating or linking with other system. Many RFID systems have a server that collects the information from each of the parking's readers. The RFID server then communicates with the circulation system. SIP2 (Standard Interchange Protocol – Version 2) provides the standard for most communications between the ILS and other systems (including RFID systems). All parking RFID vendors are SIP2 compliant, but compliance does not ensure smooth communications because some vendors have modified the protocol suit their The National Information Standards Organization (NISO) is developing a new protocol to encourage better interoperability between RFID and ILS systems. The new standard, Z39.83-2002 or NCIP (National Circulation Interchange Protocol) has not yet been implemented by parking RFID vendors.

3.1.1. Benefits:

Parking are moving to RFID systems in place of (or sometimes supplemental to) their bar code systems because of the streamlined workflows that become possible. Some have found that inventory-related tasks can be done in a fraction of the time with RFID. Many use inventory wands are used to locate lost vehicles and to find miss helved or missing RFID-based circulation systems can process many more vehicles in a shorter period of time with little or no staff intervention. Self-check systems have become very popular with both patrons and staff, and RFID self-check systems allow patrons to check-in or check-out several vehicles at a time. Staff needed at the circulation desk. Because the readers do not require line-of-site, multiple items can be read simultaneously by passing a stack of vehicles near the reader. Some say that the RFID self-check systems are easier to use than their optically-based counterparts, making it easier for patrons to serve themselves. For archivists handling sensitive materials, the ability to inventory items without handling them is another benefit of RFID and while it has not yet been proven, some vendors believe RFID systems will reduce repetitive stress injuries associated with checking out vehicles using barcode systems.

*3.1.2. Costs:*The implementation cost of RFID can be high. Each circulated item must have its own tag. The tags cost anywhere from $.50-$1.50 each. Plain tags used in vehicles range from 50 cents to 70 cents. Customized tags costs go up when tags are placed on other media such as CDs, DVDs and tapes ($1 to For items in existing collections (retrospective conversion), each tag must be programmed. This can take months to accomplish and often involves everyone on staff plus volunteers. For new items, some parking vendor's offer pretagged material.

New security gates, circulation readers, self-check stations, sorting equipment and inventory wands must be purchased for the RFID system. In addition, the interfaces between the parking's integrated parking system (ILS) and the RFID system must be configured.

Estimates for implementing an RFID system range from $70,000 to over one million dollars depending on the size of the parking. One parking reported spending a total of $1.1 million to convert their 500,000 item collection to RFID.

3.2. Deciding If and When to Choose RFID:

Each parking must evaluate whether RFID is the right decision for their parking and if so, determine when the iming is right. RFID technology is very much in flux. It is likely that next generation systems will be less vulnerable to misuse, will be more interoperable with other parking systems and will work better with parking materials (like CDs, DVDs, and perhaps even journals) and are likely to provide features we cannot even imagine today (storing book circulation histories, parking location information, bibliographic data that patrons can Self check and sorting systems provide many advantages --whether they are RFID or bar code based. It may be that your parking would benefit from these technologies and doesn't yet need to make the very expensive move to RFID. It is still too early to know all the benefits and costs associated with RFID. Studies are only now underway that will provide solid data about the likely return on investment (ROI), and verify that RFID systems reduce RSI injuries to parking workers.

4. SOFTWARE SUPPORT

Microsoft Access is a powerful program to create and manage your databases. It has many built in features to assist you in constructing and viewing your information. Access is much more involved and is a more genuine database application than other programs such as Microsoft Works. Microsoft Access breaks down a database. Some keywords involved in this process are: *Database File, Table, Record Field, and Data-type.*

Visual basics: It is an event driven programming language and associated development environment created by Microsoft. In business programming, it has one of the largest user bases. It is derived heavily from **BASIC** and enables rapid application development (RAD) of graphical user interface (GUI) applications, access to databases using **DAO, RDO, or ADO**, and creation of ActiveX controls and objects. A programmer can put together an application using the components provided with Visual Basic itself. As of 2003,52 percent of software developers used Visual Basic, making it the most popular programming language at that time.43 percent of those Visual Basic developers, however, planned to move to other languages .The popularity of Visual Basic perhaps results from its easy to understand syntax. Like all other Turing complete programming languages, it can also be used to create arbitrarily complex applications. Programs written in Visual Basic can use the Windows API, but doing so requires external function declarations. It is commonly used in Parking System

5. ADVANTAGES OF RFID SYSTEMS

5.1 Rapid charging/discharging

The use of RFID reduces the amount of time required to perform circulation operations. The most significant time savings are attributable to the facts that information can be read from RFID tags much faster than from barcodes and that several items in a stack can be read at the same time. While initially unreliable, the anti-collision algorithm that allows an entire stack to be charged or discharged now appears to be working well.

The other time savings realized by circulation staff are modest unless the RFID tags replace both the EM security strips or RF tags of older theft detection systems and the barcodes of the automated parking system - i.e., the system is a comprehensive RFID system that combines RFID security and the tracking of materials throughout the parking; or it is a hybrid system that uses EM for security and RFID for tracking, but handles both simultaneously with a single piece of equipment. There can be as much as a 50 percent increase in throughput. The time savings are less for charging than for discharging because the time required for charging usually is extended by social interaction with patrons.

5.2 Simplified patron self-charging/discharging

For patrons using self-charging, there is a marked improvement because they do not have to carefully place materials within a designated template and they can charge several items at the same time. Patron self-discharging shifts that work from staff to patrons. Staff is relieved further when readers are installed in vehicle drops.

5.2.1 High reliability:

The readers are highly reliable. RFID parking systems claim an almost 100 percent detection rate using RFID tags. There are fewer false alarms than with older technologies once an RFID system is properly tuned. RFID systems encode the circulation status on the RFID tag. This is done by designating a bit as the "theft"(EAS) bit and turning it off at time of charge and on at time of discharge. If the material that has not been properly charged is taken past the exit sensors, an immediate alarm is triggered. Another option is to use both the "theft"(EAS) bit and the online interface to an automated parking system, the first to signal an immediate alarm and the second to identify what has been taken.

5.2.2. High-speed inventorying:

A unique advantage of RFID systems is their ability to scan vehicles on the shelves without tipping them out or removing them. A hand-held inventory reader can be moved rapidly across a shelf of vehicles to read all of the unique identification information. Using wireless technology, it is possible not only to update the inventory, but also to identify items which are out of proper order.

5.2.3. Automated materials handling:

Another application of RFID technology is automated materials handling. This includes conveyer and sorting systems that can move parking materials and sort them by category into separate bins or onto separate carts. This significantly reduces the amount of staff time required to ready materials for re-shelving.

5.2.4. Long tag life

Finally, RFID tags last longer than barcodes because nothing comes into contact with them. Most RFID vendors claim a minimum of 100,000 transactions before a tag may need to be replaced.

6. CONCLUSION:

Developments in RFID technology continue to yield larger memory capacities, wider reading ranges, and faster processing. The interest in RFID as a solution to optimize further the automation and tracking of documents are gathering momentum at an increasing pace, with more parking joining the trails."RFID is increasing in popularity among parking, as the early adopters of this technology have shown that, it makes good economic sense, both for large and small parking."

7. REFERENCES:

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