

Automated Uhf RFID- Based Book Positioning And Monitoring In Smart Libraries

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ABSTRACT: RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling. This technology helps librarians reduce valuable staff time spent scanning barcodes while charging and discharging items. RFID is a combination of radio -frequency-based technology and microchip technology. Library consist intellectual capital it might be scholarly journals, books, reports, theses etc. For security purpose, the goal of the security system should be to provide a safe and secure facility for library employees, library resources and equipment and library patrons. At the same time due to application of security system, that promise to increase efficiency, productivity and enhance user satisfaction. The methodology used was serial communication in addition with embedded systems.

I. INTRODUCTION

INTERNET OF THINGS

The **Internet of things (IoT)** describes the network of physical objects—"things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the **Internet**. Things have evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things.

II. LITERATURE SURVEY

1. Title: Modeling Rfid Signal Distribution Based On Neural Network Combined With Continuous Ant Colony Optimization, Author: Zengqiang Chen

Radio Frequency Identification (RFID) is a kind of near field wireless communication

technology that can identify the specific object without direct contact. The earliest application about it can date back to the Identify-Friend or Foe (IFF) transponder made by Britain which was used to identify friendly aircraft. In recent years, with the fast developments of large scale integrated circuit and microprocessor technology, RFID is more and more widely used in every part of the world. An operational RFID system consists of readers (also called interrogators) and tags (or called transponders) which are attached to objects. Compared with traditional bar code, it enjoys some advantages like far identification distance, high environmental adaptability and multi-object recognition. As a key technology of internet-of-things, RFID has become to a hot topic in both academia and industry. Radio Frequency Identification (RFID) has been rapidly developing for recent years as a kind of near field wireless communication technology depending on radio frequency signal. Now there are widespread researches and applications about RFID. To make the distribution of tags' position rational and efficient, it is significant to obtain the signal strength model around reader. This paper uses neural network method to model the RFID reflected signal strength distribution. To achieve a satisfied solution, a continuous Ant Colony Optimization algorithm that can overcome the defect of BP algorithm is combined with neural network. We discuss the mechanism of algorithm in detail. The simulation and the actual experiment results are shown to prove the good performance of this method. RFID devices fall into two broad categories: active tag and passive tag. Active tag requires a power source to provide energy for the transmitter of tag. In this case, the tag can be read or written at a considerable distance but the integrated battery limited the tag's lifetime. Compared with active tag, passive tags transmit signal without battery.

DISADVANTAGES

- Accuracy is less in prediction model

2. Title: An Indoor Localization System Based On Artificial Neural Networks And Particle Filters Applied To Intelligent Buildings, Author: M.V. Moreno-Cano

Over the last few years, researches on Smart Buildings have evolved in real solutions that improve the indoor life of people thanks to innovations on sensors/actuator integration and control processes, among others, but more recently, thanks to Information and Communication Technologies (ICT). Another great contributor for all these changes has been the Internet of Things (IoT) approach, which considers pervasive infrastructures of fixed and mobile heterogeneous nodes designed to obtain a greater integration and accessibility. Smart Buildings aim to provide users with seamless, invisible and proactive services adapted to their preferences and needs. These services can be offered intelligently by means of considering the static and dynamical status of the building and the location of its occupants. Furthermore, gathering data about the identity and location of users enables to provide more personalized services, while wasted energy in overuse is reduced. But to cope with these objectives, it is necessary to acquire contextual information, both from users and the environment, using nonintrusive, ubiquitous and cheap technologies. In this work, we propose a low-cost and nonintrusive solution to solve the indoor localization problem focused on satisfying the requirements, in terms of accuracy in localization data, to provide customized comfort services in buildings, such as climate and lighting control, or security, with the goal of ensuring users comfort while saving energy. The proposed localization system is based on RFID (Radio-Frequency Identification) and IR (Infra-Red) data. The solution implements a Radial Basis Function Network to estimate the location of occupants, and a Particle Filter to track their next positions. This mechanism has been tested in a reference building where an automation system for collecting data and controlling devices has been setup. Results obtained from experimental assessments reveal that, despite our localization system uses a relative low number of sensors, estimated positions are really accurate considering the requirements of precision to provide user-oriented pervasive services in building

DISADVANTAGES

- Difficult to identify the location data about occupants.

III. SYSTEM IMPLEMENTATION

MODULES DESCRIPTION

1. FRAMEWORK CONSTRUCTION

RFID technology is being implemented in a number of industries. Supply chain implementation is perhaps one of the most frequently mentioned applications of RFID tags and equipment. RFID is an automatic identification technique used for the fast transaction of books, journals or DVDs using RFID tags and readers. The RFID technology helps in fast issuing, returning, and reissuing of books. The technology helps in direct transaction of information from the tags to the PC of the librarian and in automatic updation of transactions in the users account. The RFID tags can be programmed unique code. This code gets read when passing through the RFID reader. When a tag crosses the reader the reader recognizes the unique code and updates the account of the user. Modern readers have the capability of reading upto 15 tags at a time. The frequency range is upto 13.5 Hz and has a wide read range of about 2 meters. In this module, we can create the framework for two users such as admin and student login. Admin can be adding the details about books and with RFID card number. These details include book name, track information and so on.

2. BOOK INFORMATION

Libraries have been a fundamental fragment of educational and information sector of any university. The success of any library largely depends on proper management. The library management system aims in developing a computerized system to maintain all the daily work of the library. This project has many features that are generally not available in normal library management systems like facility of user login and a facility of student login. In this module, book details are added by admin. Book details contains such as author(s), publisher, identity, year, request for borrowing by users, the location of the book, etc. These details used by student for future purpose

3. ISSUED BOOK

The RFID tags are embedded into the books and are not visible for detection. The readers since they have a wide read range unlike bar code readers have the capability to read the tags even when they are embedded within the books. Special care and attention should be given in programming the tags since they are mostly programmable only once. These tags can store stack number, accession number, book number, author information etc., but the bar code technology is limited to only the identification number. The programming cost of RFID tags are much costlier than the barcodes but it should be noted that the same tag can be

reprogrammed if necessary. Depending on the applications added the cost of tag increases. Student registered into the system using their details. After that, user login to the system. And search the books by their name. Get the details about book, track details and so on. User borrows the book and scan using RFID reader. Finally enter the details into system about out time, expiry date, student details

4. RETURN DETAILS

When a user presents his/her tag, the module identifies the user and asks him to present the books. Next, the module receives the book tags from the reader. After that, the module issues a query to the database to determine the borrowing period (whether or not the returning books within the allowed period). The module displays a GUI that issuing a penalty in case that the maximum period of the allowed borrowing is exceeded.

5. ALERT SYSTEM

The RFID based LMS facilitates the fast issuing, reissuing and returning of books with the help of RFID enabled modules. It directly provides the book information and library member information to the library management system and does not need the manual typing. It also provides monitoring and searching system. The monitoring module will continuously monitor the movement of books across the gates, so that the books taken out without prior issuing will be traced out easily and will alarm the librarians. The searching module provides the fast searching of books using RFID handheld reader. As the user leaves the library after picking a book a SMS alert is given to the user regarding the book issued and the date of return. If failed to return within the due date, remainders are given. Remainders information contains the details about fine calculation for appropriate student

IV. SYSTEM DESIGN

SYSTEM ARCHITECTURE



SOFTWARE DESCRIPTION

FRONT END: .NET FRAMEWORK

The .NET Framework (pronounced dot net) is a software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large library and provides language interoperability (each language can use code written in other languages) across several programming languages. Programs written for the .NET Framework execute in a software environment (as contrasted to hardware environment), known as the Common Language Runtime (CLR), an application virtual machine that provides services such as security, memory management, and exception handling. The class library and the CLR together constitute the .NET Framework.

SQL SERVER:

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested by other software applications—which may run either on the same computer or on another computer across a network (including the Internet). Microsoft markets at least a dozen different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users. Data storage is a database, which is a collection of tables with typed columns. SQL Server supports different data types, including primary types such as Integer, Float, Decimal, Char (including character strings), Varchar (variable length character strings), binary (for unstructured blobs of data), Text (for textual data) among others.

The rounding of floats to integers uses either Symmetric Arithmetic Rounding or Symmetric Round Down (fix) depending on arguments: `SELECT Round(2.5, 0)` gives 3.

SYSTEM TESTING

Software testing is a method of assessing the functionality of a software program. There are many different types of software testing but the two main categories are dynamic testing and static testing. Dynamic testing is an assessment that is conducted while the program is executed; static testing, on the other hand, is an examination of the program's code and associated documentation. Dynamic and static methods are often used together. Testing is a set activity that can be planned and conducted systematically. Testing begins at the module level and work towards the integration of entire computers based system. Nothing is complete without testing, as it is vital success of the system.

Testing Objectives:

There are several rules that can serve as testing objectives, they are

1. Testing is a process of executing a program with the intent of finding an error
2. A good test case is one that has high probability of finding an undiscovered error.
3. A successful test is one that uncovers an undiscovered error.

V. CONCLUSION AND FUTURE ENHANCEMENT

CONCLUSION

Radio Frequency Identification (RFID) is a new generation of Auto Identification and Data collection technology which helps to automate business processes and allows identification of large number of tagged objects like books, using radio waves. RFID based Library Management system (LMS) would allow fast transaction flow for the library and will prove immediate and long term benefits to library in traceability and security. The proposed system is based on UHF RFID readers, supported with antennas at gate and transaction sections, and library cards containing RFID-transponders which are able to electronically store information that can be read / written even without the physical contact with the help of radio medium. The libraries across the globe started to use RFID to speed up the self-check in/out processes, to control the theft and to ease the inventory control in library. The barcode technology is slowly getting replaced by the RFID technology. The RFID tag does not have to be

visible for detection. It can be read even when it is embedded in an item, such as in the cardboard cover of a book or in the packaging of a product. It can also store data such as stack number, accession number, book number, author information etc., but barcode is limited to just an identification number. The cost of initialization of RFID based library is high but the cost of maintenance and time consumption of these libraries is reduced. RFID technology is believed to take off in libraries at an increasingly rapid pace. The RFID tag contents will increase in power, prices are expected to decline and tag will dramatically improve its efficiency, security and accuracy

FUTURE ENHANCEMENTS

The efficient utilization of the technology also depends upon the information to be written in tag. These applications can lead to significant savings in labor costs, enhance customer service, lower book theft and provide a constant record update of new collections of books. In future, we can extend the framework to implement the framework in real time android applications.

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