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INTELLIGENT LIBRARY MANAGEMENT SYSTEM USING GSM AND RFID

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Abstract: -

Objectives: The main objective of this research is “Digital Library”.

Methods: The analysis has been done by various methods that make our library more innovative and dedicative. The different effective techniques are considered to find the suitable most efficient technique.

Findings: To make our library digitalized and more innovative.

Application/Improvements: This Digital library display can be used for Advertising or providing information at various places like schools, colleges, government offices.

Keyword: promotional, innovative.

I. Introduction

Traditionally the attendance at an establishment is usually done in a book register. It is time consuming and space consuming process. It is very difficult to verify the attendance over long periods. Manual method is very difficult to verify the attendance recorded for a week or above. Here, chances of doing malpractice in marking attendance are high. The RFID-based equipment tracking system is an integrated system that offers an effective solution of managing items especially for large scale environment. It combines the RFID technology and security devices to ensure the items are always been monitored and secured. The system enable the organization to track and monitor selected individual to access locations, permit movement, record the important data and also enable the viewing of record via internet.

The concept of RFID can be simplified to that of an electronic barcode and can be used to identify, track, sort or detect library holdings at the circulation desk and in the daily stock maintenance. This system, consist of smart

RFID labels, hardware and software, provides libraries with more effective way of managing their collections while providing greater customer service to their patrons. The technology works through flexible, paper-thin smart labels, approximately 2"X2" in size, which allows it to be placed inconspicuously on the inside cover of each book in a library's collection. The tag consists of an etched antenna and a tiny chip which stores vital bibliographic data including a unique Accession number to identify each item. This contrasts with a barcode label, which does not store any information, but merely points to a database. These smart labels are applied directly on library books and can be read with an RFID interrogator/scanner. Line of sight is not essential for reading the tags with the scanner, therefore, the books require much less human handling to be read and processed. Middleware or Savant software integrates the reader hardware with the existing Library Automation Software for seamless functioning of circulation.

RFID-based systems have been implemented for efficient document tracking purpose throughout the libraries that combine, easier and faster charging and discharging of documents, security of materials, inventorying, stock verification and shelf handling. RFID tag's transponder listens for a radio query from the reader and responds by transmitting their unique ID code. Most RFID tags have no batteries, they use the power from the initial radio signal to transmit their response.

Instead of separate readers, the attendance can implement by the webcam in PC or mobile phones with RFID tags. Searching and sorting misplaced books among huge books is a very difficult task often. The main difficulties for the librarians are searching the misplaced books which are left in wrong location. The relocation of books in the assigned place is very complex task in day to day library access. To reduce the librarian work, the false book location is can also indicated to the librarian through RFID sensors

II. Literature survey

This paper describes the efficient library shelf management system through the wireless communication between the RFID reader and the books. The prototype also consisting of PC monitoring with embedded controller, two dc motors with drivers, RFID reader and aluminium frame stick on each rack in the book shelf. The RFID reader used to capture data from books of each row and then proceed to the next row until it accomplishes the task. This RFID reader has to move very smoothly while sending tags data to the main server through wireless communication channel.

A database is needed in this project as the scanned data that refer to the tag ID from the reader of a book must be compared to a database in order to know the details and the position of the book. The database stores a set of original data which consist of the ID tag, the author, the title of book, its call number and position. By comparing the scanned data with the original data, the books can be identified either to be in the correct shelf, misplaced or missing. In order to perform that function, Lab SQL is used as a medium to store data to the database. The step by step stages operated by MySQL are retrieving tags to filtering, matching, sorting and final displaying the book location. [1]

This paper explains about the RFID performance and evaluation which is used in the RFID shelf system. In usual system, an RFID tag can get power supplier by a reader and communicate with it for data exchange. It enables non-contact communication, various services and applications including the management of a library. However, the system is affected easily by neighbouring environment and the resonant frequency, so the communication performance is degraded. In this paper, a grid dip oscillator is used to measure the resonant frequency of RFID tag under various conditions and is shown that as the volume of book increases, the resonant frequency becomes low. To increase the resonant frequency the Ultra high frequency (UHF) RFID's are used here. [2]

This paper implemented the system is **ICGS (I-card generating system)**. It is mainly based on the computerization of Student identity card generation system. To develop this module VISUAL STUDIO 2005 used as a front end tool & back-end tool as relational database. Using this software user can easily print student identity information along with a unique barcode in a uniform format. Even a user can reprint an identity card instantly if needed from previously stored records. The "height" of a Barcode contains no information, but the higher each bar is made, the easier it may be to read when it presented to a reader. The system enables a god user-interface for the user to maintain the records. It will also provide the permanent student database and this will help to store the student

identity information in an error free and non-redundant. Even it will be very low cost to maintain the system even to print the card too. [14]

This paper introduced a low cost, low resolution camera based barcode reader, which can extract and decode the barcode sequence on a cluttered background. It is composed of three functions; they are barcode localization from the raw image, transformation of the localized barcode and decoding the sequence with an intelligent algorithm. Barcodes are simplest printed patterns that can be reliably recognized by a computer. These codes consist of sequence of parallel, light and dark stripes printed on papers. Information is encoded in the width of the stripes; sequences of a fixed number of stripes encode a character.

The sequence that defines the character is unique for the barcode type. Each barcode is started with start bars and ended with stop bars. In some barcode types a checksum digit is included in order to validate the reading. The most commonly used types are EAN 13, UPC, ITF, Code bar, Code 128, ISBN, Pharma (pharmaceutical) and FIM (postal). The transformation method, capable of identifying any orientation, is based on the Hough line detection method. The decoding method is based on the peak/valley detection method of the barcode waveform and a consistency checking method.[18]

This paper exploited the Radio-frequency identification (RFID) method used for take automatic attendance system. This technology uses radio waves to transfer data from an electronic tag, called RFID tag or label, attached to an object. This RFID has been widely deployed by various organizations as part of their automation systems, in order to produce a time-attendance management system. The hardware consists of the motor unit and the RFID reader.

The tag's information is stored electronically. The RFID tag includes a small RF transmitter which transmits an encoded radio signal to interrogate the tag, and receiver which receives the message and responds with its identification information. Some RFID tags do not use a battery. In that case, the tag uses the radio energy transmitted by the reader as its energy source. The Time-Attendance System GUI was developed using visual basic.Net. The Time-Attendance Management System provides the functionalities of the overall system such as displaying live ID tags transactions, registering ID, deleting ID, recording attendance and other minor functions. This interface was installed in the host computer.[19]

Sometimes customers have problems regarding the incomplete information about the product on sale and waste of unnecessary time at the billing counters. The proposed nodule aimed to develop a efficient system that can be used in shopping malls to solve the above mentioned challenge. The system will be placed in all the trolleys. It will consist of a RFID reader. All the products in the mall will be equipped with RFID tags. Thus the billing will be done in the trolley itself. Item name and its cost will be displayed on LCD. Also the products name and its cost can be announced using headset. At the billing Counter the total bill data will be transferred to PC by wireless RF modules. [7]

This paper presented an algorithm for the recognition of barcodes using camera phones, which is highly robust. A database of barcode images have been created, which covers falsification in homogenous illustration, reflections, or unclear image due to movements of camera. Most camera-based systems for finding and reading barcodes are designed to be used by sighted users and assume the user carefully centres the barcode in the image before the barcode is read.

The algorithm issues directional information with audio feedback (e.g. "left," "right") and thereby guides a blind user holding a portable camera to locate and home in on a barcode. When the barcodes detected at sufficiently close range, a barcode reading algorithm scans and reads aloud the barcode and the corresponding product. A novel algorithm for finding and reading 1D barcodes, which is use by blind users. The most important feature of this algorithm is the ability to detect barcodes at some distance, allowing the user to scan packages before homing in on a barcode. Experiments with a blind volunteer demonstrate proof of concept of our system, which allows the blind user to locate barcodes which were then translated to product information that was announced to the user.[8]

This paper suggests a system that automatically records the attendance of the students, using active RFID tags. Each student is provided with his/her authorized RFID tag. The serial number of each tag is associated with each student's database. The active RFID readers are capable of detecting the tags within a predefined perimeter. The

system is incorporated with a GSM module which is used to send reports of the absent students to their parents.. According to the space of the classroom the range of the reader is determined. This system can be used to create many types of reports like daily attendance details, monthly, weekly and real time feedback to parents. The attendance score calculation can be automated using the collected the concerned faculty can de-assign students from their specific tag, and reassign the tag to other students if needed. And hence the same tag can be used by many students once the course duration of one student is over. The application of RFID to student attendance monitoring as developed and deployed in this project is capable of eliminating time wasted during manual collection of attendance and an opportunity for the educational administrators to capture face-to-face classroom statistics for allocation of appropriate attendance scores and for further managerial decisions. [5]

III. Comparison of methodologies

This section provides an overview about the pros and cons that are occurred in the research methodologies whose functional scenarios are discussed in depth in the previous section. From the following table, it can be predicted a better approach that provides considerable improvement in the proposed scenarios.

Table 1. Comparison of Research Methodologies

S.NO	TITLE OF PAPER	AUTHOR NAME	MERITS	DEMERITS
1	RFID-Based Intelligent Book cs Shelving System	Thein Moe Win and Wahyudi - Martono	High detection accuracy High sensitivity	This approach is more costly.
2	An RFID-based System for Library Management and Its Performance Evaluation	Kiyotaka FUJISAKI	The expected work run as fast on a 200HMz Pentium.	Its takes more time for scanning the finger.
3	Barcode Reading Algorithm For Blind Users	Pooja Gajul, Supriya Gawai2, and Shashank Chavan	High accuracy Time consuming	Waste of time.
4	A Survey Paper on Automated Attendance Monitoring System using Face Recognition	Surabhi and S. Deshmukh	Computerised method make time consuming.	Manual attendance takes more time.
5	A Students Attendance System Using QR Code	Fadi Masalha, Proc. Sigcomm	Avoid waste of precious time.	Waste of time.
6	FACE RECOGNITION BASED ATTENDANCE MARKING	K.Senthamil Selvi, P.Chitrakala and A.Antony Jenitha	processing time is reduced to less than 1sec.	Processing time is more.
7.	DPPC RFID Based Automatic Billing Trolley	Galande Jayshree, Rutuja Gholap and Preeti Yadav	High average accuracy High precision High recall	It requires further improvement

4. Conclusion

The RFID reader also enables it to capture tags data from all books and update to the interface. The end user can monitor the system performance and easily get the misplaced books lists without exerting desperate efforts in searching those books. This system can also be employed in other applications like retail shop or industries, where the stocks are required to be monitored. Further improvement to the system would also be made in future to have more robustness in reader motion which is the most crucial part of the system; otherwise the desired tags will be out from the reachable range. Moreover, the reading algorithms in displaying captured data would further be analysed to make adjustment to include any needed functions. The scope of work of the research is to develop an automatic library shelf management system to assist the librarians for more efficient shelf management to find any misplaced books on the library shelf. GUI for the system was developed using Proteus 8. Subsequently a Shelf ID was created and coded to the RFID tag. The system then used this code to find any misplaced book on the selected shelf. In the future the system can be extended further using data synchronization with the web. So the student can access books remotely.

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We the authors assure you that, this is our own work and also assure you there is no conflict of interest.

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