RFID BASED SMART LIBRARY

MD IRSHAD HUSSAIN B[1], NAMRATHA B S[2] ,MONISHA R B[3] ,
SAHANA GADUGINA [4],C M VEENA[5] ,MUFEEDA S F [6]

[1] Asst. Professor, Department of Master of Computer Application, UBDTCE, Davangere
[2 3 4 5 6] Student, Department of MCA, UBDTCE, Davangere

Abstract

Library circulation is low because of the tedious and time-consuming nature of the institution's traditional management. In addition to being waterproof and anti-magnetic, the Radio Frequency Identification (RFID) labels can be encrypted, have a huge storage capacity, and more. Using RFID as a foundation, we develop a comprehensive system architecture that takes into account the hardware and software requirements of the university library. The RFID system streamlines library operations by adding intelligence and automation. Using RFID middleware, the system is able to integrate RFID and library management in a natural way, resulting in a library management system that is both efficient and scalable. In order to demonstrate the system's overall functionality and each of its sub-functions, the use case diagram is a ground breaking concept. System for managing libraries and identifying books via radio frequency (RFID)

The proposed system is based on RFID readers and passive RFID tags that are able to electronically store information that can be read with the help of the RFID reader. This system would be able to issue and return books via RFID tags and also calculates the corresponding fine associated with the time period of the absence of the book from the library database

1. INTRODUCTION

No physical touch is required to identify, sort, and detect a wide range of objects using Radio Frequency Identifying (RFID), a non-contact, automatic identification technique that utilises radio waves. RFID is an automatic identifying system that can be used to store and retrieve data remotely utilising devices known as RFID tags. RFID readers and RFID tags must work together in order for this technology to work. It is possible to quickly issue, reissue, and return books using RFID-enabled modules in the RFID-based LMS. It eliminates the need for manual data entry by transmitting book and user information directly to the library administration system. In order to identify a book's title or code, the RFID tag does not need to be pointed toward a separate database. An RFID reader reads the data instead of the usual barcode reader often seen at the circulation desk of a library. RFID can alleviate this issue by speeding up the process of performing circulation procedures. "Radio Frequency" is defined by Automatic Identification and Data Capture (AIDC) as:

Radio waves are used to transmit data between a reader and an electronic tag that is affixed to a specific object. Object identification and tracking are among the most common applications. There are two types of bar codes: the "Bar Code" and the "Radio Frequency Identification," both of which employ tiny microchips in tags to store and communicate information about the item they are attached to. Unlike bar codes, RFID can store more data, may modify the recorded data as processing occurs, does not require

line-of-sight to transfer data, and is particularly successful in hostile settings where bar code labels may not work.

2. LITERATURE SURVEY

[1] This paper provides a survey on radio frequency identification (RFID) technology. Initially RFID tags were developed to eventually replace barcodes in supply chains. Their advantages are that they can be read wirelessly and without line of sight, contain more information than barcodes, and are more robust. The paper describes the current technology, including the frequency ranges used and standards. With the increasing ubiquity of RFID tags, however, privacy became a concern. The paper outlines possible attacks that can violate one's privacy and it also describes counter measures. The RFID technology did not stop atitem-level tagging. The paper also presents current research that focuses on locating and tracking labeled object that move. Since the uses for RFID tags are so widespread, there is a large interest in lowering the costs for producing them. It turns out that printing tags might become a viable alternative to traditional production. The paper reviews the current progress

[2] There has been a rising interest in a secure framework that must be solid and quick to react to enterprises and organizations. RFID (Radio Frequency Identification) is one of the solid and quick methods for recognizing any material article. Their huge favorable position is that they can read wirelessly, contain more data than standardized identification and progressively hearty in nature and in view of non-observable pathway innovation. RFID tags can read in any natural testing conditions where others read innovation likes barcode or optical card reader useless. In this research, we purposed a secure system that provides information about the attendance of students. In this framework when the card brought close to the RFID module, it reads the card data and its contrasts and the information in the program memory and showcases the corresponding name to that card. The attendance is saved in a text file on the SD card then it converted to an excel sheet on the computer.

[3] RFID systems are becoming very popular nowadays as they play a very vital role in reducing thefts with less human effort. Industries, shopping malls and departmental stores have started using RFID tags and readers in order to reduce the theft. Nowadays RFID systems have become an integral part of day-to-day life. RFID in libraries are a developing technology and is being implemented in small in small and medium sized libraries. Implementation of RFID will help in reducing the work burden of the administrator as well as the user in arranging and searching the books respectively. In the present systems employed there are special methodologies for arrangement of books, journals, DVDs and so on. These techniques need to be strictly followed in order to help the users find their book or their requisites. This paper helps in finding a solution to this tedious problem faced by most libraries in an easy way.

[4] The present invention demonstrates the designing of an automated library system which is based on RFID Technology. The system helps in reducing staff requirement, increasing the efficiency of the management, reducing cost, increasing accuracy and security of the management. In the system RFID technology is explained as an application for library management system which is extremely helpful to implement such an automated library management system. The system includes 3 layers for operation wherein these are a hardware system, a software system, and ware layer. The functioning of each and every module is described in the projected paper. The project is implemented for university/college/school libraries. The system explains whole functioning starting from and ending to circulation of books.

[5] A Library is a collection of information, sources, resources, books, and services, and the structure in which it housed. For increasing the quality of service and efficiency of operation new technologies has always been interest for librarians. The library is at the forefront in successfully implementing RFID technology thus reducing the time and staff required for circulation of books, and simultaneously, increasing book transactions per hour. RFID is a new generation of Auto Identification and Data collection technology which helps to automate library processes and allows identification of large number of tagged objects like books, using radio waves. The proposed system is based on 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. For the case study, Agrinar Anna Central Library (AACL), Bharathiar University was chosen. The University Library as an important role in providing modern facilities. The AACL started using RFID in the year of 2017 under the supervision of University Librarian RFID in the year of 2017 under the supervision of University Librarian Dr. R. Sarangapani, for their regular activities like circulation, shelf management, stock verification shelf rectification and theft detection etc. Data were collected from archival data, observations and asking questions from Librarian and other Library professionals about RFID system.

[6] Radio Frequency Identification (RFID) is one of the most exciting technologies that revolutionize the working practices by increasing efficiencies, and improving profitability. The article provides details about RFID, its components, how it works, and its usage in different sectors i.e. retail sales and supply chains, livestock industry, courier services, military and prisons, automobiles and logistics, entertainment industry, publishing industry, wireless transaction, and, especially, in LIBRARIES. The article also presents an in depth analysis of RFID uses in Libraries with implementation roadmap, its impacts on libraries, and a comparison of major vendors and their products.

3. Methodology

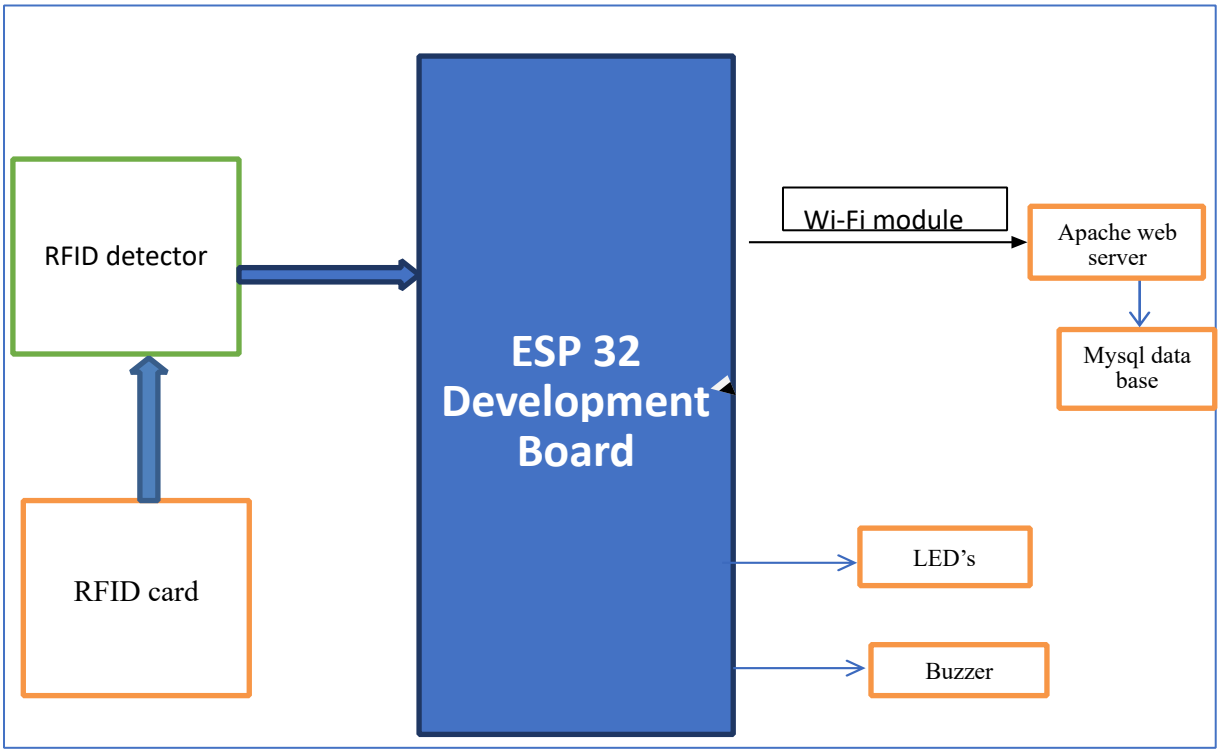

Figure 1: Block diagram of proposed system

RFID Reader and Tag

Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder; a radio receiver and transmitter. When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to inventory goods. There are two types. Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader; up to hundreds of meters. Unlike a barcode, the tag doesn't need to be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

RFID tags are used in many industries. For example, an RFID tag attached to an automobile during production can be used to track its progress through the assembly line; RFID-tagged pharmaceuticals can be tracked through warehouses; and implanting RFID microchips in livestock and pets enables positive identification of animals.
Since RFID tags can be attached to cash, clothing, and possessions, or implanted in animals and people, the possibility of reading personally-linked information without consent has raised serious privacy concerns. These concerns resulted in standard specifications development addressing privacy and security issues. ISO/IEC 18000 and ISO/IEC 29167 use on-chip cryptography methods for un traceability, tag and

reader authentication, and over-the-air privacy. ISO/IEC 20248 specifies a digital signature data structure for RFID and barcodes providing data, source and read method authenticity. This work is done within ISO/IEC JTC 1/SC 31 Automatic identification and data capture techniques. Tags can also be used in shops to expedite checkout, and to prevent theft by customers and employees.

ESP32 KIT

This kit fetches the information form sensors and converts the analog data to digital; these data get processed using C language and uploaded to server using Wi-Fi configured network.

Wi-Fi network

Data collected from sensors needs to be uploaded to remote server; it is done using a

Wi-Fi network, it is required to mention ssid and password in the code to establish communication.

Web server

The apache HTTP server is web server which we used to run our project and this server provides the built in MySQL there is no need of using command prompt. Apache web server we need to install then only we can execute the project. Apache web server provides local host to run our project. Apache web server is web server which provides web applications. Apache plays an important role in our project execution. It is the most important and most popular server which provides World Wide Web growth. It works for millions of web sites.

Apache web server is mainly handled by Apache Foundation. Apache web server provides service to number of working system including UNIX, LINUX, and Microsoft Windows. Apache server is very good server which provides very good service to our chosen platforms and apache is well comfortable with PHP language and works well with PHP language and even server side scripting language is used in this to perform and develop the project.

Apache supports the different features to perform the operation and even apache server is also supported by some graphical user interface and Apache server also implements the security and digital certificates security.

Database

It is accessible for all wide used computing platforms. MySQL software package and documentation n are often downloaded from http://www.mysql.org. Some UNIX system distributions, like the one from Red Hat, embrace MySQL. Once you've got with success logged into MySQL, it's able to receive command. If the MySQL, info to be accessed already exists however its name wasn't enclosed once work into they use command are often accustomed concentrate on the info of interest.

If a replacement info is to be created, the info itself should be created initial so the tables that may create the tables. the opposite MySQL commands that are required here- INSERT, SELECT, Drop, Update and Delete- are all the implementations- of the matching SQL commands. There are several -tools accessible to assist in info administrations example MYSQL administrator may be a program that performs configuring`, monitoring`, beginning and stopping`, a My-SQL server, organization user and associations, playing backups`, and a number of other body tasks.

Server side Scripting (PHP)

PHP stands for Hypertext Pre-processor. It is a programming language used for create active web pages. Program written in PHP must be saved with file extension.PHP in the root directory of the web server, to execute PHP programs we need a web server called "Apache Web Server". User communicates with dynamic web page so that they get the customized information. MySQL access the data generated by using a dynamic web pages. HTML can also combine/embed PHP tags .PHP language is a user friendly and coding of PHP language is easy compare to other language. PHP is close to Perl and JavaScript; PHP arrays are different from other language and are then introduced by a description of PHP's function and their parameter passing mechanisms. PHP is at the present urbanized, disseminated, and as an opensource product, supported. Most modern web servers now have a PHP processor installed. It is a scripting language used on servers. Of course, PHQP is utilised for relationship management and information intake. Information entrée has be a first-rate focus of PHP development as a result, it's driver support for fifteen totally special information system. PHP supports the general electronic message protocol POP3 and IMAP. It conjointly prop the spread object architecture COM and CORBA. once a browser request associate degree PHP script is included by extension in an XHTML document that was provided by a web server. The PHP processor just transfers the XHTML code to the computer database after finding it in the input data.

PHP is typically strictly taken, as is that the case by JavaScript. Fresh PHP implementation`s do some recompilation, a minimum of on advanced script, that will increase the speed of understanding. there's an oversized assortment of functions for making and manipulate PHP's array. PHP supports each procedural and object-oriented programming. several of predefined functions area unit won't to give interfaces to different software package like mail and info system.

4. Result Discussion

Fig 2:Scanning the Student card

The Above figure shows the way, the card is being reded by the RFID reader, after reading the card the student details and book details and the date is saved in the database and it the green colour light for the indication of the book is scanned. If the book is not scanned then the sensor sense the book and it shows red colour and a buzzer is turned on to indicate that the book is not scanned.

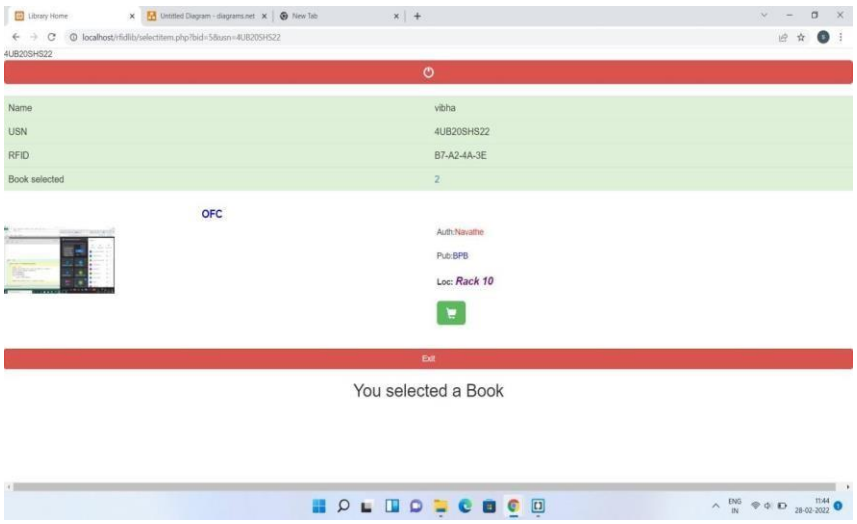

Fig 3:Student book details

The above figure shows the details of the student and the book displayed immediately after scanning the student card with the RFID reader, and the displayed data is also recorded for the further use.

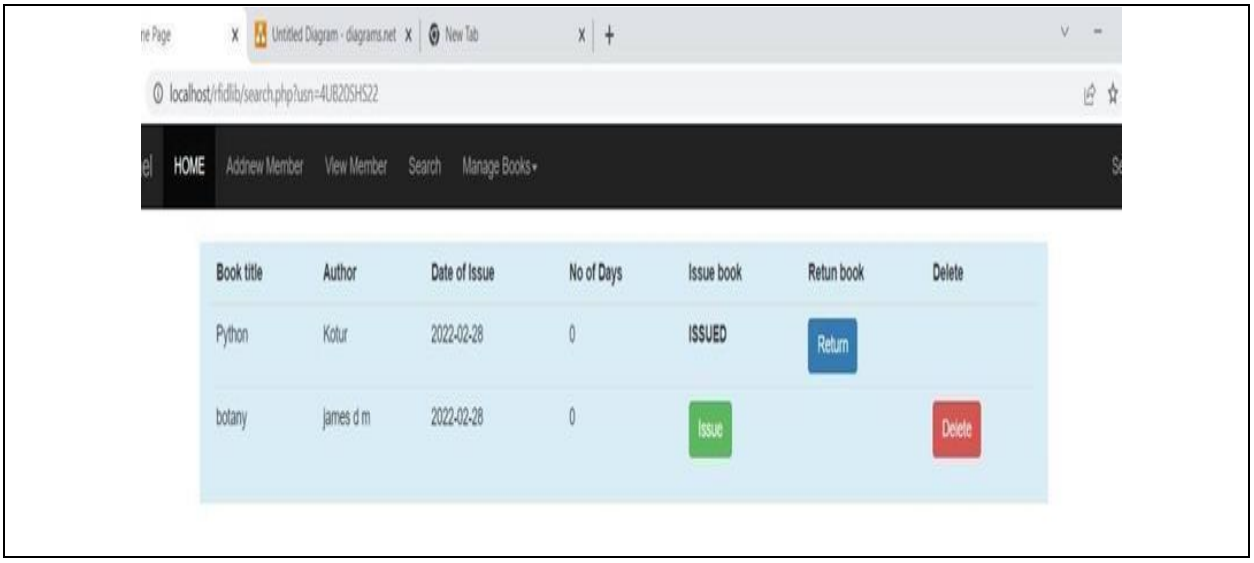

Fig 4: Book Issued details page

The above figure shows the details of the books being issued to the students and it includes the book name and book taken date and it also shows the when the book as to return. if the book is returned it also shows

the returned status and issued status, if we want to clear the student details after returning the book you can also see the delete option here.

5. CONCLUSION

The proposed project entitled RFID based library is an attempt to combine iot and web technologies to develop an useful product which finds useful for schools and colleges of library, using this product students could explore books of library by scanning the card and select the desired books and get it issued by concerned staff, it achieves contact less browsing and helps to explore various books present in the library. Finds useful for staff to manage the various transactions.

6. FUTURE WORK

The work carried out has certain limitations like -

It needs to be connected to internet while it is operating. Further work can be extended to make it work both in offline and online modes.

The system compels the stake holders to use the system with professional ethics otherwise it can be breached through RFID tag cloning and impersonation.

The system can be improved with extending it to identify and prevent attacks due RFID tag cloning.

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