

LIBRARY AUTOMATION SYSTEM USING RFID

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Abstract— *This paper presents, design and development of the, library management Information system, which will assist a librarian in managing books in a library of colleges and universities. The main aim is to computerize and maintain all the status of books in library on daily basis. This software system has many features which are generally not available in normal library management systems like facility of user login, teacher's login, admin login through which the admin can monitor the whole system. The librarian after login into admin account can generate various reports such as student report, issue report, teacher report and book report. It will help the students, staff and librarian staff of library to maintain the library in the best way possible and reduce the human efforts. The system would provide a basic set of features to add/update members, add/update books, and manage check-in specifications for the systems based on the client's statement of need.*

Indexed Terms—RFID, LABVIEW, Management Information System, Library Management

I. INTRODUCTION

In the library system there are many types of issues. The books that have been issued were not replaced in their proper place. And to maintain the proper place of books was a very hard task for the librarian. So due to this there is a large chance of the books being lost. Sometimes, the students can steal the book or they may not put an entry for the books which they are taking. Thus to provide the books for a large number of readers and to maintain the exact record is a difficult task. The RFID system provides a key too effectively for collecting, managing and distributing the books. We also need the software for managing the library. The proposed library management system software provides the systematic handling of the records of books and users. E-Library Management System is an application which refers to library systems which are generally small or medium in size. It is used by librarians to manage the library using a computerized system where he/she can add new books, videos and

Page sources. Books and student maintenance modules are also included in this system which would keep track of the students using the library and also a detailed description about the books a library contains. With this computerised system there will be no loss of book record or member record which generally happens when a non-computerized system is used. All these modules are able to help librarians to manage the library with more convenience and in a more efficient way as compared to library systems which are not computerised. Library Management specifies details of books in the Library depending upon several categories like Author-name, Publication, Sales, etc. Manual Library management thus becomes a hectic task for the administrator as he is required to update all the details of the borrower, dates of issue and receipt manually. This manual management system may lead to errors in updating or deletions in the Library Database, thus it decreases the quality. Automation in library management will lead to less manual intervention, more accuracy in library operations and good quality product for the customer as well as the administrator.

II. LITERATURE SURVEY

Paper [1], demonstrates the application of robots for library management systems. Library administration is an asset arranging framework for libraries, used to track things owned, orders made, bills paid, benefactors who have acquired.

Humanity has dependably strived to give life-like qualities to its antiquities trying to discover electives for himself to do his requests furthermore to work in a scary situation. The well-known idea of a robot is of a system that looks and works like an individual. In this very creating development, time and labor are restrictions for finishing undertaking on extensive scales. Automation is playing an important role to save human efforts in most of the usual and frequently

carried works One of the best applications is library management [2].

Usually we need a librarian to pick the book and give it to the one whom the books are being issued. This is a difficult task in case the library floor area is large. Humans take more time and effort to issue the book. To defeat this trouble, Robotization is done in the library to fast delivery of books using robotic arms. The use of robots characterizes some of modern trends in automation of the modern process. This project is a pick and place robotic arm myRIO based mechatronic system. EM18 RFID reader is used to recognize the book [4]. The system [7] helps to keep the records of books.

The research was developed in integrating the RFID system and the creation of Graphical User Interface (GUI) at the host PC. 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 Microsoft Visual Basic.Net. The GUI task is to store detailed information of the book to the database. 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 [3].

An internet based concept is incorporated with RFID technology to form an internet based application for the library management. The RFID reader Motorola 10 MC9090 is used for the entire process which is carried inside the library. This reader is a compatible reader that can read any kind of tag of frequencies like Low, High Ultra High. Every user and every book is provided with a RFID Tag 107 which has a dedicated, unique EPC (Electronic Product Code) which is made in relation to the database for the further details [6].

Internet concepts are put forward with the help of the Internet of Things architectural layer. The idea of monitoring and sensing the library environment from a location and to identify the materials, books, CD's, etc. present inside the library for easy access of the library was observed to be the most common issue. In this paper the problems faced in the library environment like locating the misplaced or miss shelved book or materials, reducing the manual work

and ease access of the books are done and a solution is developed that could overcome these problems with better enhanced work. In libraries, the management of the book is a very complicated and time consuming process. The location of books could be altered by students, teachers and anyone around the library. In this proposed method, the librarian has to maintain the database. The users can be able to access their account after showing their ID [7].

After taking the book, if the user is not showing the book ID, the user account will be blocked in the main databases. The user can get the information about books issued and return date. If the return date exceeds, then the fine will be updated automatically in the databases. If the users are misplacing the books, accounts will be blocked. The librarian can only release blocked accounts. The user can get the book without the help of the librarian. With an increasing number of the student body, office automation is one of many possible solutions to provide better and personalized service to students [8].

This automation also includes library services, covering self-loan, self-return, and self-pickup, which commonly use RFID (Radio Frequency Identification). The problem arises in RFID based self-service system for library automation, which is how to ensure that the ID card of the patron truly belongs to the person using the service. This problem follows the self-loan service since the ID card of the patron is used only when borrowing the collection. Another problem is how to ensure that the borrowed collection is the actual collection registered in the LMS (Library Management System). This research proposes a business process of a self-loan system design that minimizes fraudulent practice in borrowing collections by merging image capture of the patron and the borrowed collection where the librarian is not necessarily present for circulation [9].

In order to solve the problem that it is inconvenient to find books in the traditional library, a kind of book positioning system using RFID technology is designed to achieve fast search for the books in the library. The JRM2030 RFID reader module is used to locate and search books with electronic labels on the bookshelves. The system software is designed by using LABVIEW. And the book positioning system

can search books by typing in the title of them, and get the distance between the tag and the reader referring to the strength of wireless signal [10].

This paper provides system specifications in section 3, methodology in section 4, results obtained in section 5, conclusions and future scope in section 6 and 7 respectively.

III. SYSTEM SPECIFICATIONS

Operating system- Windows 7 is used. Database firebase is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write. Development tools and Programming language- Dart- flutter framework is used to write the whole code and develop webpages. Flutter- Flutter is an open-source Software Development Kit (SDK) for “building beautiful, natively compiled applications for mobile, web, and desktop from a single codebase”. Flutter comes with a large collection of pre-built widgets (rows, columns, stacks, padding, center, etc.), making it much easier to design and layout your mobile application. This means that instead of having to have separate codebases for your iOS app and Android app, you can utilize Flutter and have one codebase for all the different platforms that you want your application to support. Some companies that use Flutter are Google, Groupon, Alibaba, Square, eBay, and more. Dart - Dart looks a bit like C and is an object-oriented programming language. So, if you prefer the C languages or Java, Dart is the one for you, and you’ll likely be proficient in it. Dart is not only used for mobile app development but is a programming language. Approved as a standard by ECMA (ECMA-408), it’s used to build just about anything on the web, servers, desktop and of course, mobile applications (Yes, the same people who standardized our favorites ES5 and ES6). Android Studio-Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA . On top of IntelliJ’s powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps, such flexible Gradle-based build system, fast and feature-rich emulator, unified environment where you can develop for all Android devices, Extensive testing

tools and frameworks, Code templates and GitHub integration to help you build common app features, and import sample code and Lint tools to catch performance, usability, version compatibility, and other problems

Arduino Uno and RFID are the hardware components.

IV. METHODOLOGY

The block diagram of proposed Library using RFID is shown in Figure 1

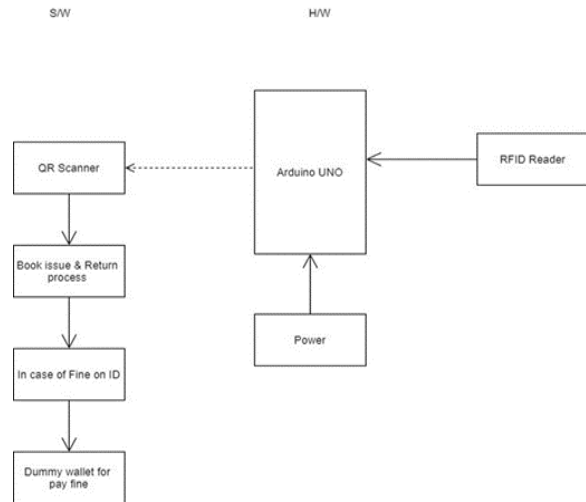


Figure1. Block diagram of proposed library management system using RFID

Here this would require each member to possess an RFID card whose chip would contain the person’s contact details, a unique identification code and details of the book (or journal, magazines etc.) in possession of that member. For any new entry, the system would require creation of membership, which would then allow the person to utilize the library amenities. Data from both the person’s RFID tag and from the book would be scanned by the RFID reader, which in turn communicates with the microcontroller. The microcontroller processes the acquired data and then sends the output data to the main computer for storing information in the database. The master database consists of sub databases for each member. Depending upon the option chosen (out of the four options mentioned in the software section of Figure 1), that is book issued or return. Also, it will check the database related to the fine of the individual.

Each book and member card will have a unique barcode. The system will be able to read barcodes from books and members' library cards. The functional requirements of proposed system are as follows.

- User id is provided when they register.
- The system must only allow user with valid id and password to enter the system.
- The system performs authorization process which decides what user level can access to.
- The user must be able to logout after they finished using system.
- Register New User feature can be performed by all users to register new user to create account. For this System must be able to verify information and system must be able to delete information if information is wrong.
- Register New Book feature allows to add new books to the library. For this system must be able to verify information, enter number of copies into table and not allow two books having same book id.
- In search book feature, found in book maintenance part, we can search book based on book id, book name, publication or by author name. for this system must be able to search the database based on select search type, to filter book based on keyword entered, to show the filtered book in table view and able to add detailed information about events.
- System should be able to display information on notice board available in the homepage of site

The features of the proposed library management system are as follows

1. Any library member is able to search books by their title, author, subject category as well by the publication date.
2. Each book will have a unique identification number and other details including a rack number which will help to physically locate the book.
3. There could be more than one copy of a book, and library members are able to check-out and reserve any copy. Each copy of a book is called as a book item.
4. The system is able to retrieve information like who took a particular book or what are the books checked-out by a specific library member.

5. There is a maximum limit on how many books a member can check out.
6. There is a maximum limit on how many days a member can keep a book.
7. The system is able to collect fines for books returned after the due date.
8. Members are able to reserve books that are not currently available.

The system is able to send notifications whenever the reserved books become available, as well as when the book is not returned within the due date. The flow chart to check out a book is given in Figure 2.

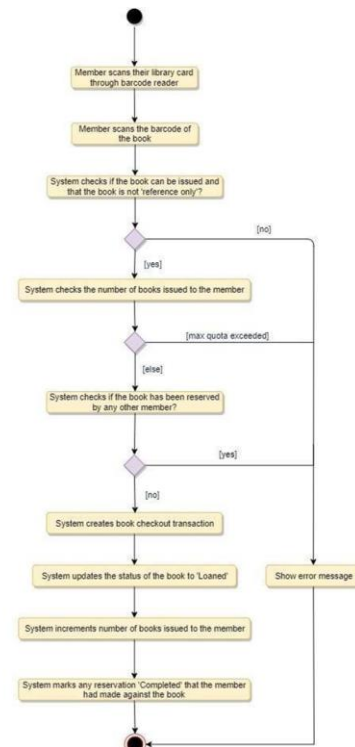


Figure 2. Algorithm to check out a book

V. RESULTS AND DISCUSSIONS

The proposed library automation mobile application has designed and developed. Depending on requirements of each university, features can be added or modified. This application avoids the manual work and the problems concern with it. It is an easy way to obtain the information regarding the various products information that are present in the Library of a particular college.

VI. CONCLUSION

The proposed library automation system works on computer as well as mobile. It provides a computerized version of library management system which will benefit the students as well as the staff of the library. It makes entire Process online. Student can search books, staff can generate reports and do book transactions. It also has a facility for student login where student can login and can see status of books issued as well request for book or give some suggestions. It has a facility of teacher's login where teachers can add lectures notes and also give necessary suggestion to library and also add info about workshops or event happening in our college or nearby college in the online notice board.

VII. FUTURE SCOPE

In this application many more features such as online lectures video tutorials can be added by teachers as well as online assignments submission facility, a feature of group chat where students can discuss various issues of engineering can be added to this project thus making it more interactive more user friendly and system which fulfills each users need in the best way possible

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