

# RFID Technology Based Library Management System

Sarmistha Satrusallya, Aneesh Wunnava

**Abstract**— 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.

**Index Terms**— RFID Tag, RFID Reader, Library Management, Automatic System, Bar Code.

## I. INTRODUCTION

Conventional process for management of a library is very much time consuming, as the manual process require much time and makes the system slow which results in wastage of time for readers as well as for inventory. There are always large number of books are present in every library and it increases as time passes. So, the management of a library is very difficult task for a person in a traditional way[1]. Libraries require large numbers of books, we cannot do any compromise in this because these are very necessary for both students and teachers. The advancement in management increases the efficiency and service quality. The use of RFID for management of book releases many librarians. The flow of books can be amplified by the introduction of technology in the system and librarians can do other work also[2][3].

The present paper is designed to manage the libraries of colleges/universities/schools which completely relied on “Radio Frequency Identification and Detection technology”. The technology for management makes the system automatic and intelligent. In this paper second section describes projected work, Third section of the paper explains the combination of RFID technology and management system. Third section is focuses on functioning of every module present in the system[4][5][6].

Now-a-days, street lights consume large part of power.

The experimentation by following the work done.

## II. RELATED WORK

### a) Related Technology:

The technology used in the project is Radio Frequency Identification and detection technology. The technology uses electromagnetic waves to transmit related data. ‘RFID’ (radio frequency identification) is a sort of wire restricted technology for communication and technology. An ‘RFID system’ comprises of three basic elements that are a scanning antenna and transceiver and a transponder, the RFID card. An ‘RFID’ card consists of memory, microchip and antenna. The RFID reader module is network-connecting device that is indelibly portable. To convey signals technology follows radio frequency waves that make the card activated. After the activation of the card, the card or tag directs a wave to the consisting antenna back, wherein it’s transformed into a data form[7][8].

### b) Application of the Technology:

RFID system, a self-determined system for management that comprises software atmosphere and hardware atmosphere both but to perform a definite function it the technology is combined with other technologies. The RFID based library consists of 3 layers wherein first layer is made up of RFID System, second layer is a ware layer, and third one is a layer for library management[9].

The first layer is made up of hardware and software system. Second layer which is a ware layer is interlinked between management system and RFID system. The second layer is comprising an interface and a component to process the data. System consists a structure of application interfacing that is used to interlock with further technical structure, thus the related data in diverse systems to attain resource-sharing

### i. Hardware System:

The prime components of hardware system are RFID card and RFID reader module.

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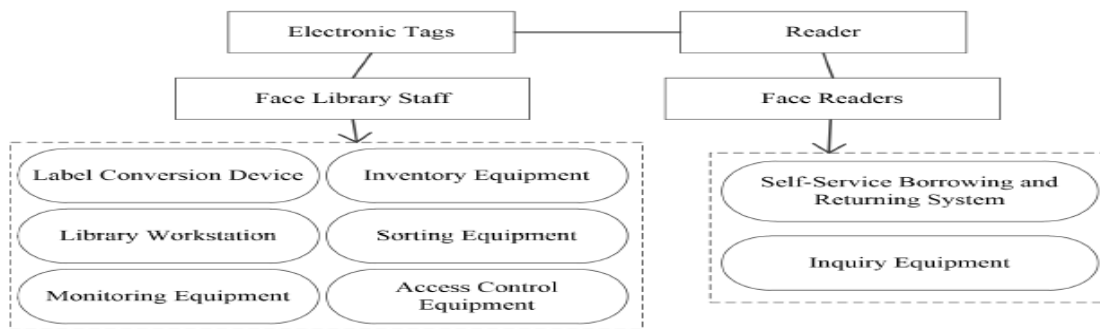


Figure 1. RFID system hardware

the hardware system also comprises label alteration devices, workstations for librarian, sorting equipment, inventory equipment, entrance control, safety amenities, borrowing and returning system, review apparatus.

ii. *Software System:*

System software because of the spreading of Web apps and diverse n/w atmosphere with the help of “Sun’s Java 2 Platform Enterprise Edition” (J2EE) as a stage for developing software. “J2EE” is intended for huge enterprise hostleve type computing, provided the decent frame-work to build scalable, easily-maintained, and flexible business systems. The frame-work helps all features of enterprise applications from design progress to definite applications. The “J2EE” stage comprises a service set, different protocols, and application program interfaces (APIs). “J2EE” for accessing various type of database via the “Java Database Connectivity” (JDBC), usages “Enterprise Java Bean (EJB)” to progress and implement dispersed business logic, uses the “Java Server Pages (JSP)” response to client, then realize the layer operation

iii. *Second Layer (Ware Layer):*

The second layer is intermediate link between RFID software and application system. The layer is a message leaning layer. The data is which is related, is dispersed in the procedure of message from a program to other and then further. Middle layer is used for providing a shared set of application programming interface (API) that attaches to the reader, and analyses the respective RFID tag’s data and other processes. The second layer consists of 3 components as shown in the Figure 2 that are reader adapter, event manager and an application interfacing.

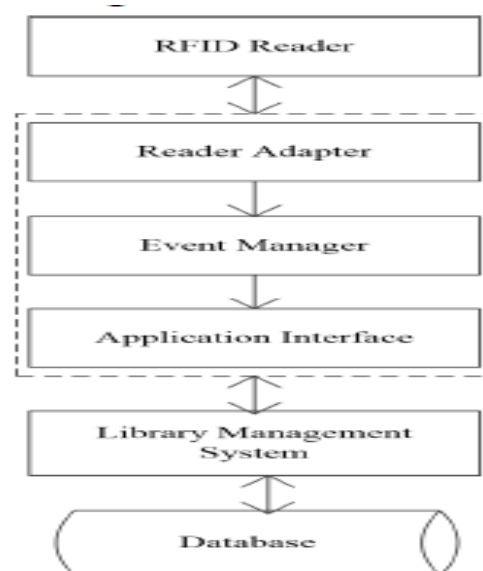


Figure 2 Representation of second layer

III. LIBRARY MANAGEMENT SYSTEM AND RFID TECHNOLOGY

The management system of library can be improved with the introduction of the “RFID Technology” in the system. Data assembly, categorization, record, positioning and similar works come under the management system. The automation in the library system decreases the required mankind (Staff) for the management and hence, reduces the cost of the system. The process is also gets simplified by the automation in the management. It saves time and space. Depending on the applications of “RFID Technology” in the library system, the management system includes various constrains like self-service, books borrowing, registration of books, categorization, and positioning and similar management aspects. It shields the entire management and facilitate process for a library. Depending on demand of applicant operation, this would fetch complete novelty and elevation to the system management and operation of the library, for simplifying the book passage work and expand the efficiency of circulation, expanded security level, and progressively recognise the library divergence, digitalization and intellectual management and different objectives.



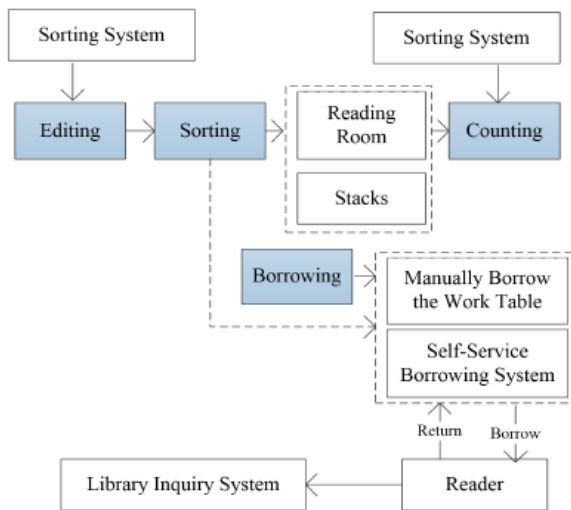


Figure 3 Flow chart for the system with RFID technology

The system for managing libraries that uses “RFID technology” implements “Business Process Reengineering (BPR)” to shorten the process, recovers the effectiveness of the staff, advance the circulation rate of the books and expand the facility of a library. System expansion precise duty process analysis, combined with “RFID technology management system”, the book into the library after the first categorization of cataloguing and label work related to writing and related to reading, and after that the sorting system is used to categorise the types of books and shelves, afterwards books can be borrowed by the readers. The choice between manual borrow process and self-help system depends on the readers, the sorting system is used to return the book the books are classified and shelved. In accumulation, one can also custom the RFID joint with automatic record equipment literature resources inventory enquiry operation of the library. Explanation, RFID based, business process for library is categorized into editing, borrowing, inventory of the 4 major processes and sorting. It can be seen from Figure 3.

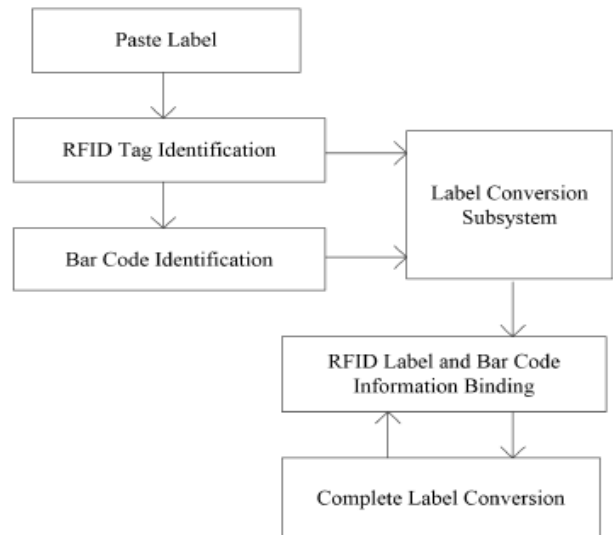


Figure 4 Process of electronic label conversion

#### IV. METHODOLOGY & RESULTS

The model operation embraces a label alteration subsystem, a system for the self-service lending and returning, record counting sub-system, access control of security access, etc. Explicit module operation examination is given as:

##### A. Sub-system for converting label:

For the purpose of fast exchange of Label to “RFID” tag this sub-system is employed. The sub-system works with mainly an “RFID” tag transfiguration hardware equipment and software system for exchange; IN accordance of the necessity of user the software sub-system would be modified. The label conversion equipment is interlinked with the software and “RFID” tag is attached to the book in any hidden page of the book. Contactless interpretation of “RFID” tags, while the bar-code has been read, and after that the related data of the code of the book is rapidly transcribed to label. Bar code and RFID tag information bonded in series completing the conversion of the label of a book. Precise procedure is represented by Figure 4.

##### Sub-system for self-service lending and returning:

The system includes self-operation for lending books, book returning, renewing book, and also the receipt for that. Enter all the information about borrowing system which is automated in accordance to tips of library card.

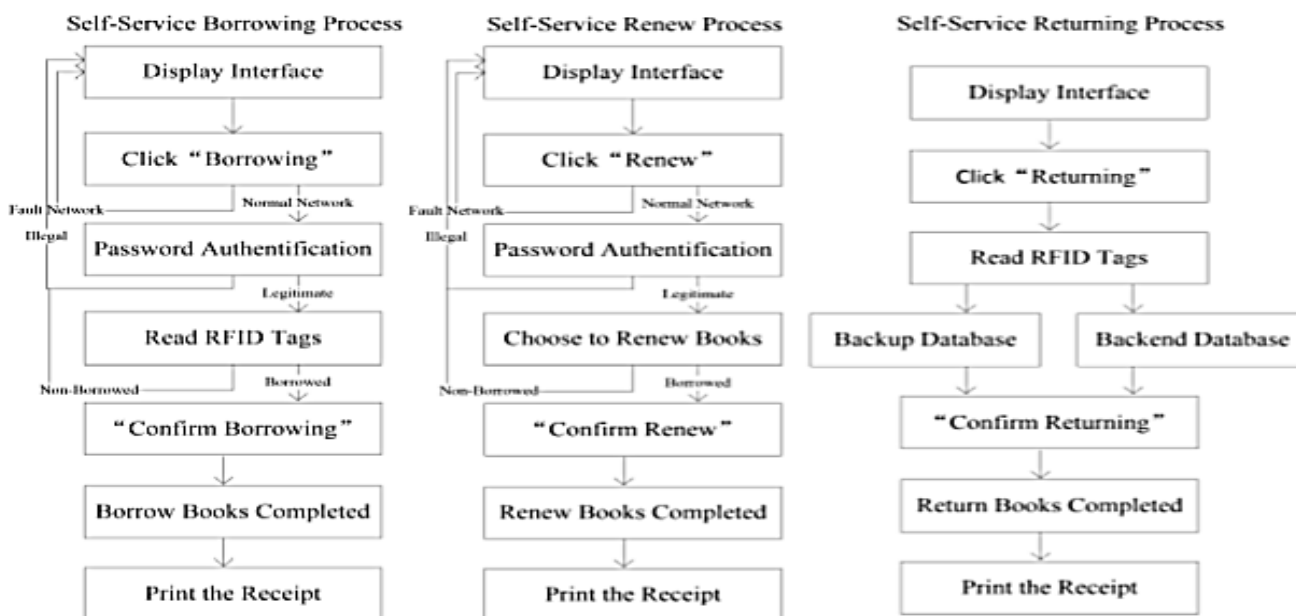


Figure 5 Self-service lending and repaying subsystem

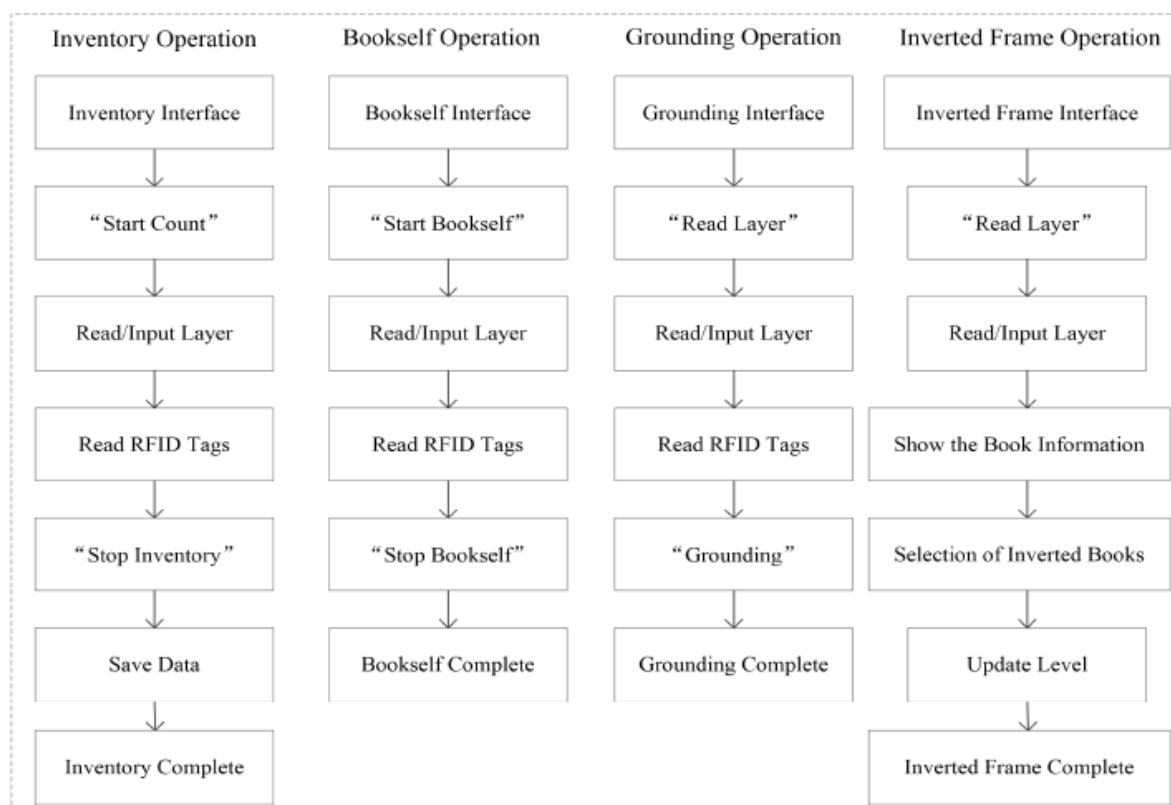


Figure 6 Flow chart for of sub-system for inventory count

Checking the damage, debts, and all related information. First enter the given password to sign in and get the data of library card, and then the “RFID” tag is scanned by the reader and recognise the RFID tag no. is registered or not, then get the data of the bar code, modification in the status of lending or returning/renewing books. The “RFID” reader is able to read upto 20 “RFID” tag data of books at a time. For renewal of the books, sign in the system’s central interface and press the "renew "button ,documentation of the certificates is done by scanning of the card (library card), then password would be entered and there is a button

"confirm renew " for renewing books. For Self-service returning back the books, sign in to the system prime interface and then click on “returning” button, this would put the book in the scanning area for the RFID reader for scanning and identifying the no. of RFID tag, check After that identify the information present in the bar code and analyse the state then return it. The process for the sub-system is shown in Figure 5

*B. Sub-system for inventory count:*

The chief operation of this system, includes inverted frame, book record, along with the shelves for the books, and grounding etc. In advanced inventory “RFID” reader is used to check and show the data and place of the book, the accomplishment of the upturned frame, bookshelf, and grounding etc. The precise procedure of system is shown in Figure 6.

*C. Safety access control:*

Safety access double time scans and attached with an “RFID” tag, magnetic stripe present in the book and Anti-theft observing system device for identifying the safety. It acts as a safety door for the external world. It also reads the authorizations of reader and information about the books, in the absence of the library card the books are not moved by the reader for take out the security access, an alarm and light would be generated. The system is employed with the security controlling system to stop the books from missing out of library.

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## V. CONCLUSION

The projected work utilizes the “RFID” technology which provides high security, confidentiality, worthy standard presentation, modest procedure and intelligent controlling. The presented project helps in solving the difficulties of traditional management system for library, such as difficult, time taking, less secure system etc. The advanced Library management system can be achieved by using “RFID technology”. Present paper emphasizes on the scheme of management system for a university/college/school library centred on RFID, the building of the hardware system and software system environment. The system management design in the real time use, to recover the passage of book-rate, release employees, and improve the speed of operation of library facility

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