

Real Time IT based Library Management System

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Abstract: This proposed paper represents the Real time library issuing and returning system. The Current methods of issuing the books from library is time consuming and have to follow multiple steps by the librarian for each books to be issued he take the book and ID card of student/staff and then scan the card & book with the barcode reader to issue and register the books to the card number in the server (Database). This implemented method it is slow and need multiple counters to issue/returning books. Our paper presents one of the solutions that can be used to work fast and smoothly without any use of counter system and workload to the library staff and cutting down the waiting time for the students. The books will automatically be issued and returned from the library and the Librarian doesn't have to keep attention on every student coming in or going out of the library. This is possible by the use of radio frequency identification (RFID) tag and reader to issue and return the books.

Keywords: RF-scanner, RFID (Radio frequency identification), issue or return, Library staff, Real time library, server (Database);

I. Introduction:

1.1 Existing system

Currently in most of the Library the handheld barcode reader machine is used to issue or return the books. The librarian scans the book and checks on the computer the availability of the book if book is available then scan the Id of the student do some clicks to agree to issue or return the books to the student. This process needs specific counters, library staff, barcode reader machine, computers to transfer the scanned data to display it on the screen and to store the books information (issued/returned) in server (Database). As though barcode made storing and retrieving books information easy to a large extend though it was time consuming and the students has to wait in a queue for their turn to issue or return the books.

Sometimes the students may forget to issue the books and just walk out of library and the book is not registered as issued in the server. This may cause Loss to the library and security is at lowest level in that library. This would mean that the books can be taken without issuing it. The solution for this is can be to appoint one person just to check the students by keeping an eye to the students while entering and exiting the library. Currently the use of Radio frequency identification (RFID) instead of barcode reader has increased it works same as the barcode reader. Overall process is same as the barcode working system. The Radio Frequency Identification (RFID) technology is used in library but manually.

1.2 Proposed system

We present a Real time library system that can be used to issue and return the books automatically by just a pass through the Radio frequency Scanner in the library using RFID technology. The student and faculty ID cards will contain RFID In it and books will contain RFID tag stick on it. The tag on the book will contain information of the book and a unique ID provided to each book which will help to differentiate from other books (ID, name, pages, publisher, author, country, etc.).

1.3 The required components:

- Computer.
- Radio frequency scanner.
- Radio frequency identification (RFID) tag sticker.
- Laser scanner (to understand if any person passed through the RF-scanner)

The student/faculty entering the library can have these purposes:

- Search book.
- Issue book.

- Return book.

1.4 The working of proposed system:

The students are not allowed to enter the library without their ID card. If Student enters the library without ID card then an alert with the buzzer sound will be activated to alert and notify the present staff and the student that he has not taken his ID along with him. As the student enters the library the laser rays will get disconnected for a second indicating the person movement through the RF-scanner. The ultra-high frequency RF-scanner will scan the ID card data and check in the server (Database) for its authentic user. The student after searching the required books from the library can take the book and just walk out of the library by passing through the RF-scanner (the student doesn't have to go to any counter or stand in any queue to issue or return the books).The scanner will automatically scan the books and the ID card and collect its data. The scanned data will be Differentiate as ID card data/ book data and check the book data inserver(Database) by checking the book unique id in the issued list.If the book id is in the list of issued books then don't perform any action. If not in the issued list and available then issue the books to that ID card holder.

II. Literature review:

- In this paper author explained that multiple books can be scanned at once by the use of RFID reader. RFID reader is placed on corner of the shelf which scans all the books placed in series on that shelf and how the data of the books fetched by the scanner Ref from [1].
- The paper described the RFID based EAS gate scanner which is used to scan the any RF-tags and read data stored in that tag by just a pass through the scanner.

III. Objectives:

- To provide students and librarian the easiest way to issue and return the books from the library
- To know Just by passing through the ultra-high frequency scanner and stopping the manual work of Librarian.
- To make easier way to maintain Database and stop unauthenticated users from entering the library.

IV. Model:

In this proposed system we would like to introduce the architecture and working model for it and it shown in the following figures

4.1 Architecture:

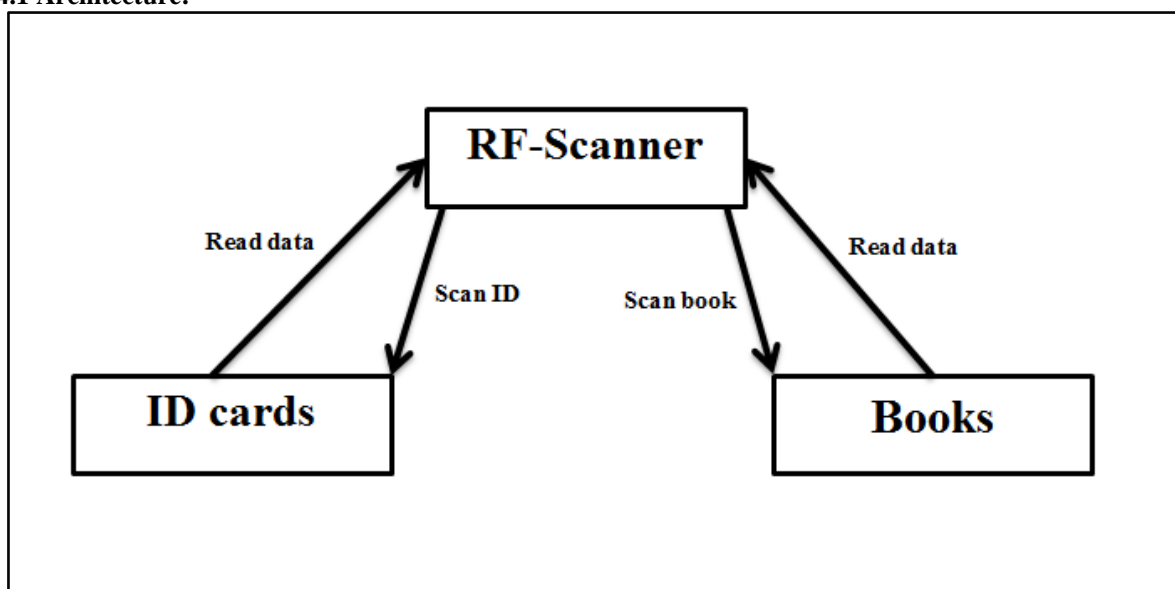


Fig: 1 task of the ultra-high frequency RF-scanner.

4.2 controller:

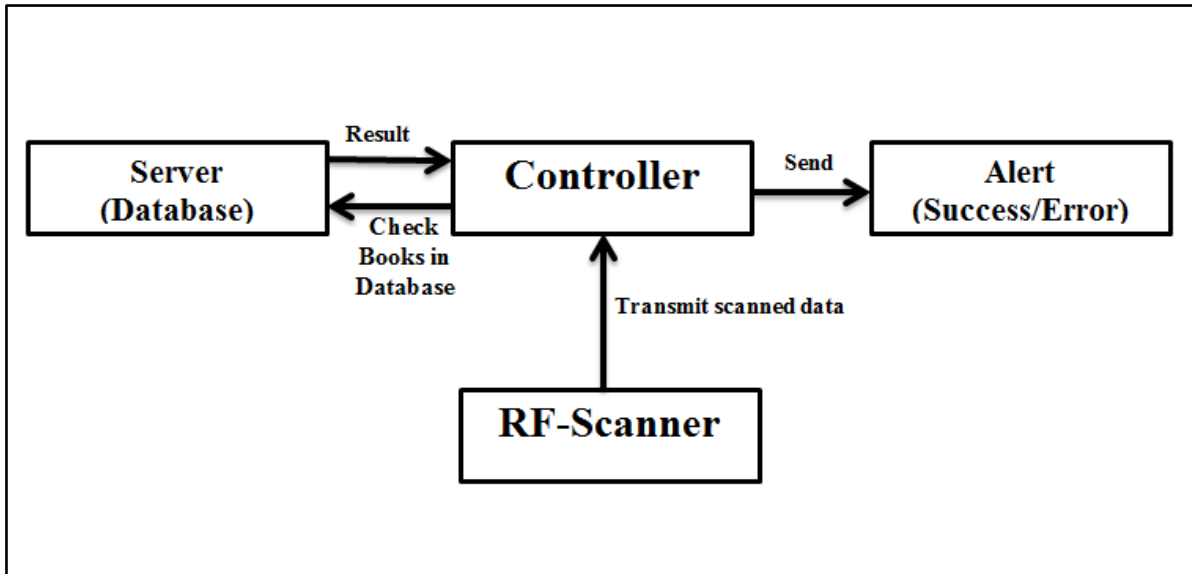


Fig: 2 task of the controller (The controller will be a desktop application a program that accepts scanned data from the RF-scanner and will validate and perform as instructed)

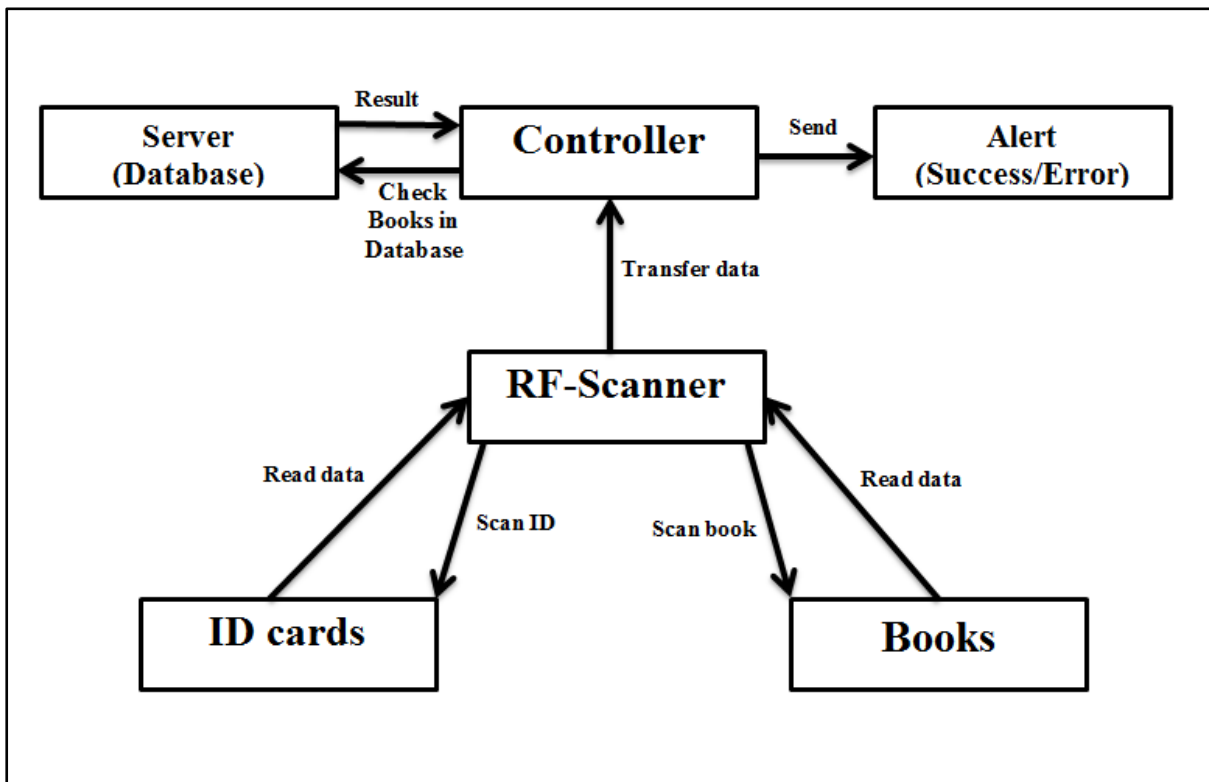


Fig: 3 Controller when combined with the ultra-high frequency RF-scanner.

4.3 Instruments:

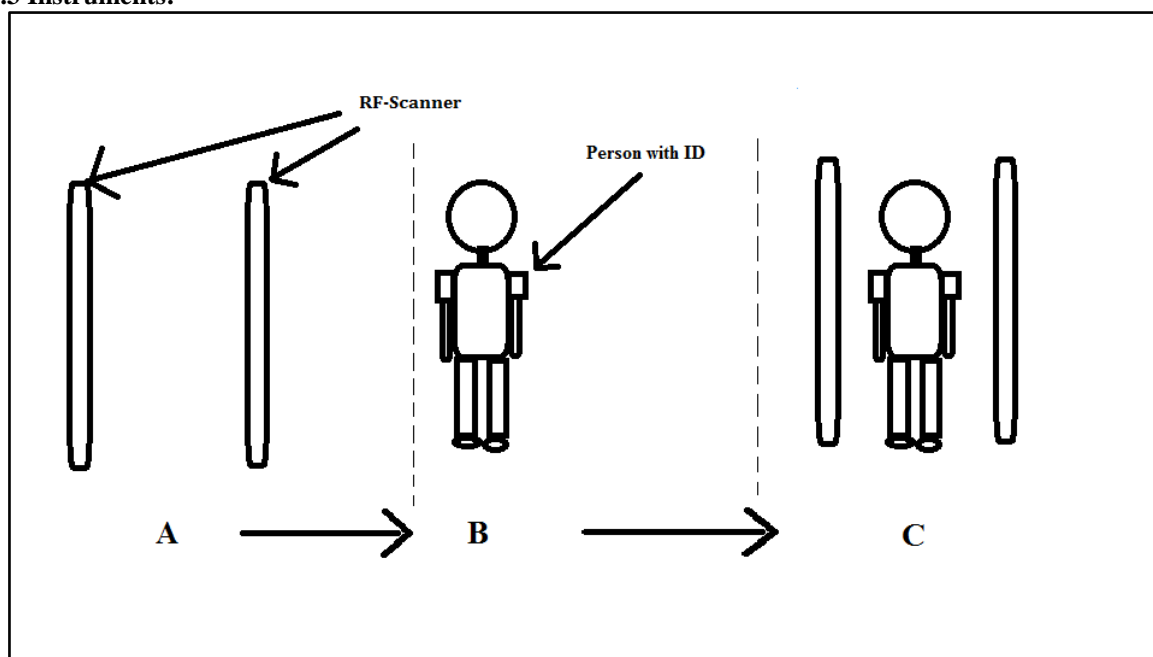


Fig: 4 a) the person Entering the library, b) The person with ID card, c) Person passing through the person entering the library.

4.4 Working model

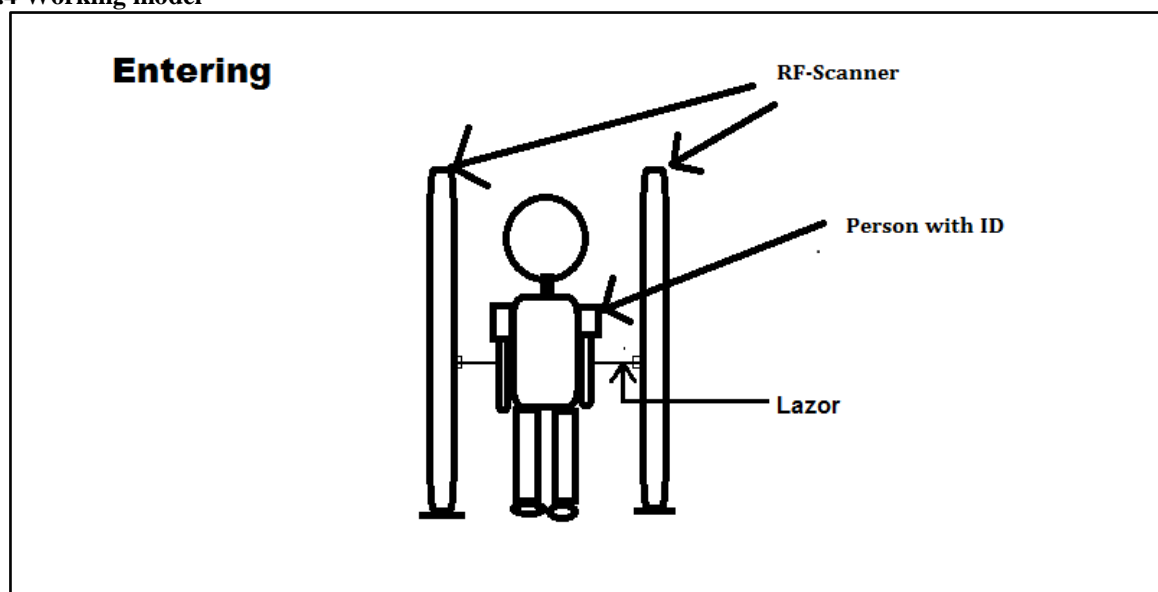


Fig: 5 the person entering the library

Algorithm:

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If (no ID detected) then
    Alert;
If (detected ID is more than 2) then
    Alert (more than 1 ID card detected);
If (ID detected) then
    Check the Id details in the database;
    If (found) then
        Do nothing;
    Else
        Alert
    
```

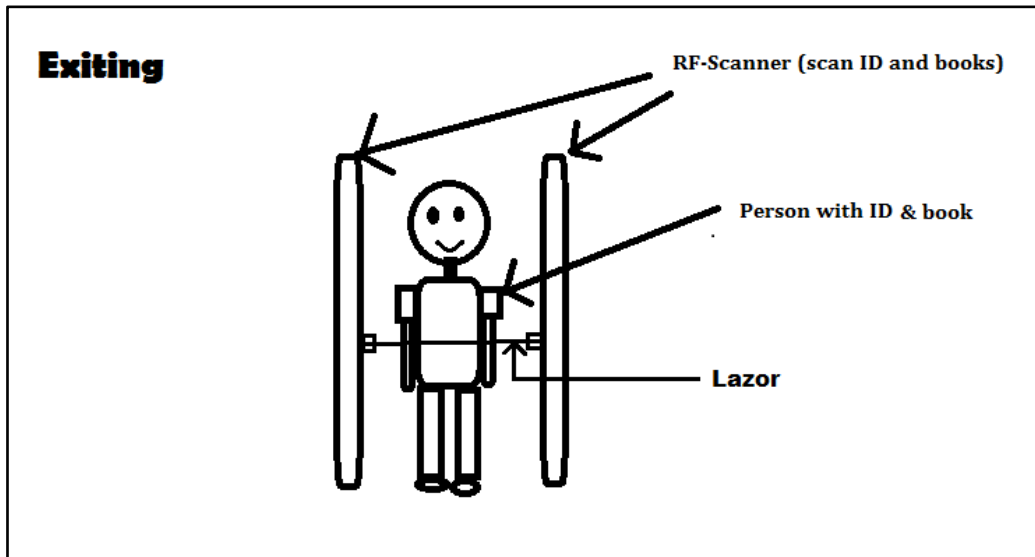


Fig: 6 the person Exiting the library

Algorithm:

If (no ID detected) then

Alert;

If (detected ID is more than 2) then

Alert (more than 1 ID card detected);

If (both ID and book detected) then

Authenticate the ID and check the book in the issued list;

If (book found in the list) then

Do nothing;

Else

Add the book in the issued list and link with that ID card;

Returning:

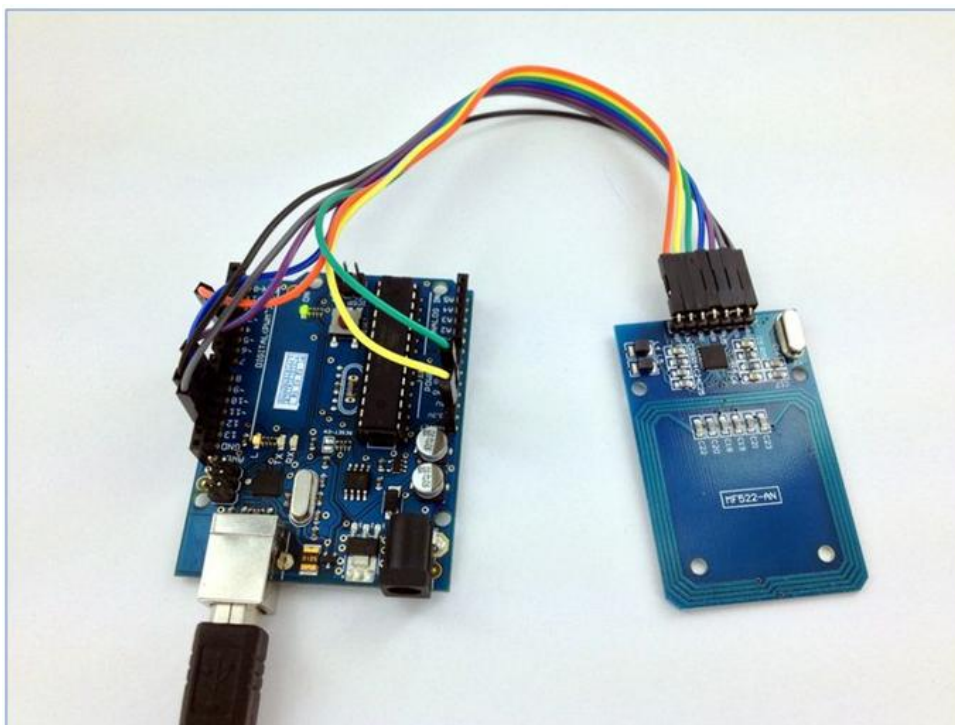


Fig: 7 Arduinio Uno RFID reader connected with the USB cable to the computer.

[source: www.googl.com]

To return the book to library

- The students have to take the book close to the RFID reader.
- The RFID reader will scan the book code and remove the book data from the server (Database) issued list.
- The computer will display message indicating the success or failure to return the book acknowledging the student.

V. Results:

This is a proposed system so we are in the implementation phase using RFID technology. Our proposed system can be implemented and will work as proposed. The RFID tag and Scanner are used in many systems and can be used in managing the library too.

VI. Conclusion:

In this proposed paper, we present ultra-high frequency scanner that automates the issuing and returning the books from the library using RFID technology. We give an overview of the system architecture, working model, instruments used for creating the automatic real time library issuing and returning system. The use of RFID technology in library will reduce the workload of librarian and no multiple counters required then after. Students can easily enter the library and get the books without any obstacle or wait for any authentications checking and reduce waiting time of student's in queue.

References:

- [1]. Haiming Cheng, Ling Haung & He Xu, Yifan Hu, IEEE 2016, "Design and implementation of library books search and management system using RFID Technology"
- [2]. Jia Liu, Feng Zhu, Yanyan Wang et al., IEEE INFOCOM 2017, "RF Scanner: Shelf Scanning with Robot-assisted RFID Systems"