CHAPTER 1

INTRODUCTION

Traditional library management is time consuming, laborious and low library circulation rate. The Radio Frequency Identification (RFID) has the characteristics of waterproof, anti-magnetic read distance and the label data can be encrypted, large storage data capacity and other technical features. We focuses on the design plan of university library management system based on RFID and elaborates the overall structure design of the system including the system hardware and software environment. Through the design of the system the RFID brings automation and intelligence to the library management. The system is based on RFID and depends on RFID middle ware as the media to achieve the organic combination of the advanced RFID and library management and offers very effective technical means to the library management. The innovation is the use case diagram to explain the overall function of the system and its sub functions, and realize the intelligent management from the book entry to the circulation of books. Keywords-RFID; Library management system; Intellectualization.

Figure 1.1: RFID in Libraries

Radio Frequency Identification (RFID) technology is a non-contact, automatic identification technology that uses radio signals to identify, sort and detect a variety of object including people, vehicles, goods and assets without the need for direct contact or line of sight contact. RFID is an automatic identification method, which can store and remotely retrieve data using devices called RFID tags. The technology requires co-operation of RFID reader and RFID tag. The RFID based LMS facilitates the fast issuing, reissuing and returning of books with the help of RFID enabled modules. It directly provides the book information and library member information to the library management system and does not need the manual typing.

The RFID tag can contain identifying information, such as a book's title or code, without having to be pointed to a separate database. The information is read by an RFID reader, which replaces the standard barcode reader commonly found at a library's circulation desk. RFID provides a solution to such a problem, by reducing the amount of time required to perform circulation operations. According to Automatic Identification and Data Capture (AIDC) "Radio Frequency identification is a technology that uses radio waves to transfer data between a reader and an electronic tag which is attached to a particular object. Typical uses are for object identification and tracking". According to Harrod's Librarians' Glossary and Reference Book2 "Radio Frequency Identification, an alternative to the Bar Code that uses tiny microchips in tags to holdand transmit detailed data about the item tagged. RFID has advantages over bar codes such as the ability to hold more data, the ability to change the stored data as processing occurs, it does not require line-of-sight to transfer data and is very effective in harsh environments where bar code labels may not work".

Figure 1.2 : People standing in queue in Libraries

One step is to decide on which kind of RFID reader and tag is used for library automation. The importance of reader are what kind of tag it reads, its operating frequency, capability of near reading, writing inside the tag , connection type with computer The reader has two main functions: the first is to transmit a carrier signal, and the second is to receive a response from any tags in proximity of the reader. A tag needs to receive the carrier signal, modify it in some way corresponding to the data on the card, and retransmit the modified response back to the reader. Further, tags which are located in book are binding with the specific Id. In modern passive RFID devices; the tag consists of a small integrated circuit and an antenna. The benefit of passive RFID is that it requires no internal power source; the circuit on the tag is actually powered by the carrier signal. Thus, the carrier signal transmitted from the reader must be considerably large so that the response can be read even from the card.

CHAPTER 2

LITERATURE SURVEY

New technologies are creating new opportunities for libraries. RFID is an upcoming technology which has recently attracted the interest of the research community because of the astonishing benefits it offers over the other existing identification and data capturing technology. Several related studies have been carried out by the academic community which devoted to the technicalImprovement of RFID technologies.

Shaini Gopinath *et al* [1] for increasing the quality of service and efficiency of operation new technologies has always been interest for librarians. Her paper aimed to access and evaluates the use of RFID by research scholars of Mahatma Gandhi University.

Hilal Ahmad *et al* [2] publish "The usage and effectiveness of RFID technology" in Allama Iqbal Library. The library is at forefront in successfully implementing RFID technology, it reducing the time and staff for circulation of books. He found that the inventory control never conducted prior to RFID was carried out easily by hand held inventories within a short time. The RFID technology is primarily intended to reveal a current change in thelibrary user service from semi-automated to fully-automated mode.

Palmer *et al* [3] help the library manages to transform and modernize their services in a way that meets the needs of their 21st Century customers—not just as replacement for barcodes but allowing greater access, more staff time for assisting readers, freeing up space, better stock control, etc., with the help of RFID technology and basic and optional components. RFID isused in libraries primarily to automate the book handling process which includes checkout, inventory control, check-in, and anti-theft.

Mamdapur *et al* [4] for faster and better services to their users to improve the efficiency of operations and as a roadmap approach for implementing RFID**.** The implementation of RFID technology certainly improves service efficiency for libraries and enables more diversified applications and service modes. However, according to Yu (2008), there is a need for regulatingnecessary standards, processes, and interfaces to fit in with current information systems and extending automatic library operations requires

continuous effort, with user satisfaction in library context satisfy library users from time to time information-seeking behavior of libraryusers to track travelling paths using the RFID system promote a user-friendly experience.

Shahid *et al* [5] revealed that RFID helps save the precious time of staff consumed in scanning bar-codes for circulation of library resources.

Hadro *et al* [6] described that RFID technology involves a huge investment; therefore, costs and benefits of this technology should be studied carefully before implementation. However, he also stated that costs of RFID equipments have sharply come down with further developments in technology.

Tseng *et al* [7] say that automated library equipped with RFID and self-checkout system has fulfilled majority of the needs of techno-oriented users. A finding of their study suggests that unfamiliarity of users is a major problem in operating automated circulation system. They also revealed that Open Book Intelligent Library circulates and helps in self-check-out without human intervention.

Engel *et al* [8] reveal that RFID beats bar-code readers as it speeds up circulation transaction and tracking books. It also simplifies charging/discharging activities, provides high speed inventory and machine identification of books as seen in earlier studies. Mehrjerdireviews the fundamentals of RFID systems, identifies both risks and key benefits and uses of RFID in libraries.

Dwivedi *et al* [9] indicate that libraries adopt RFID as a substitute for barcode systems for identification and tracking of documents. They found that factors like system quality, quality delivery of information, use and user satisfaction can persuade users towards libraries for RFID enabled services. Describing RFID as the fastest, easiest and most efficient way to locate and manage library materials at low cost.

Renold *et al* [10] suggested an internet based RFID technology to form an internet basedlibrary management system in which RFID reader can be used for inventory control. He also revealed that RFID identified the problems like locating misplaced/ mis-shelved materials and simultaneously reduced manual work and enhanced ease of access. Some

of his findings, that RFID involves low cost; however, contradict with those of earlier studies by Yu and Hadro. Butters, Bahri and Ibrahim suggest that lack of knowledge as the big challenge in optimizing the use of RFID technology. Besides being dependent on vendors at various stages ofimplementation, RFID system had many problems like privacy, security and change in library setting and setting tagging stations, which frustrate librarians and pose huge risk for successful implementation. After examining the different factors that affect the self- service check out applications.

Hui *et al* [11] recommended a set of parameters for successful RFID project. These parameters include fixed orientation of books (i.e. at 0 degree), using of metal shielding to coverthe entire check-out station, prevention of signal leakage and tag position affixed to a book to keep signal reading performance intact. This study has its own limitations as it is related with implementation part only.

Ajami *et al* [12] also revealed RFID as costly venture, it outweighs its disadvantages by improved safety, reduced medical records errors, minimized waiting time consumed in paper based documentation, streamlined automation and identification process, besides easy and fast access to users. The lack of ICT policies Makori to adopt and embrace modern technologies into mainstream information services can impede the adoption and development of RFID applications in university libraries. Often, the policies to guide university libraries with regard to adopting technological solutions are not followed.

Sandu *et al* [13] in their article “Awaking stock taking practice in academic libraries using Radio Frequency Identification (RFID) technology” opined that with the implementation ofRFID technology, stock verification can be done within a few hours with the help of DLA. The DLA allow libraries to keep track of missing books, books on loan, etc. It also helps in proper arrangement of books in the stack area.

Sugie *et al* [14] in his article entitled "Application of Radio Frequency Identification technology to study library users- information-seeking behavior" analysed two approches of RFID technology to assess information-seeking behaviour in the university library in Saitama, Japan. He opined that RFID was found to be an effective tool for revealing and analyzing pattern of information-seeking behaviour of library users and can also be applied to the assessment of whether services or locations of resources in a given library are adequate. He highlighted that the greatest advantage of RFID was that more data was collected with greater ease and accuracy than with traditional methods. The noted disadvantages of the RFID were thatlocating tags required much effort and that the RFID system could not guarantee enough accuracy of the read range.

Bansode *et al* [15] in their case study entitled "Implementation of RFID technology in University of Pune Library" highlighted various problems faced by library staff with regard to the lack of availability of technology experts, resistance of the users towards change, lack of standards, etc. They reported major benefits of implementing RFID in stock verification, tracking of shelving of the books and missing books, quick circulation of books.

Radha *et al* [16] in her paper entitled "Deployment of RFID at academic libraries: issuesand best practice" stated that the RFID technology is applicable to various activities in libraries like automated check in/check out without the intervention of the library staff, theft detection, stock verification, etc. and comprise many components including RFID tags/labels, library staff station, security gate, self service units, shelf management, etc. and it can be extended to many more areas in future. She concluded that as RFID has its own issues and benefits, most of the Indian institutions have RFID for tracking the library materials, for detecting theft and auto check in /out, etc.

Sarmistha Satrusallya *et al* [17] "RFID Technology Based Library Management System" in International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue-11S,. This 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

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.

2.1 OBJECTIVES

- To automate the library management process using RFID .
- To reduce the burden of officials working at library.
- To detect unauthorized carrying of books and alert concerned authorities.
- To maintain the correct database.

2.2 PROBLEM STATEMEMT

In the present system of library management books details are stored using application software but the process of issuing and returning is still done manually, students have to visit library, carry the required book and get it issued by officials. For getting books issued they need to produce the membership cards. It is important to digitalize the existing library and the problem of barcode technology. The drawback of the abovementioned technology can be overcome by using RFID technology.

CHAPTER 3

METHODOLOGY

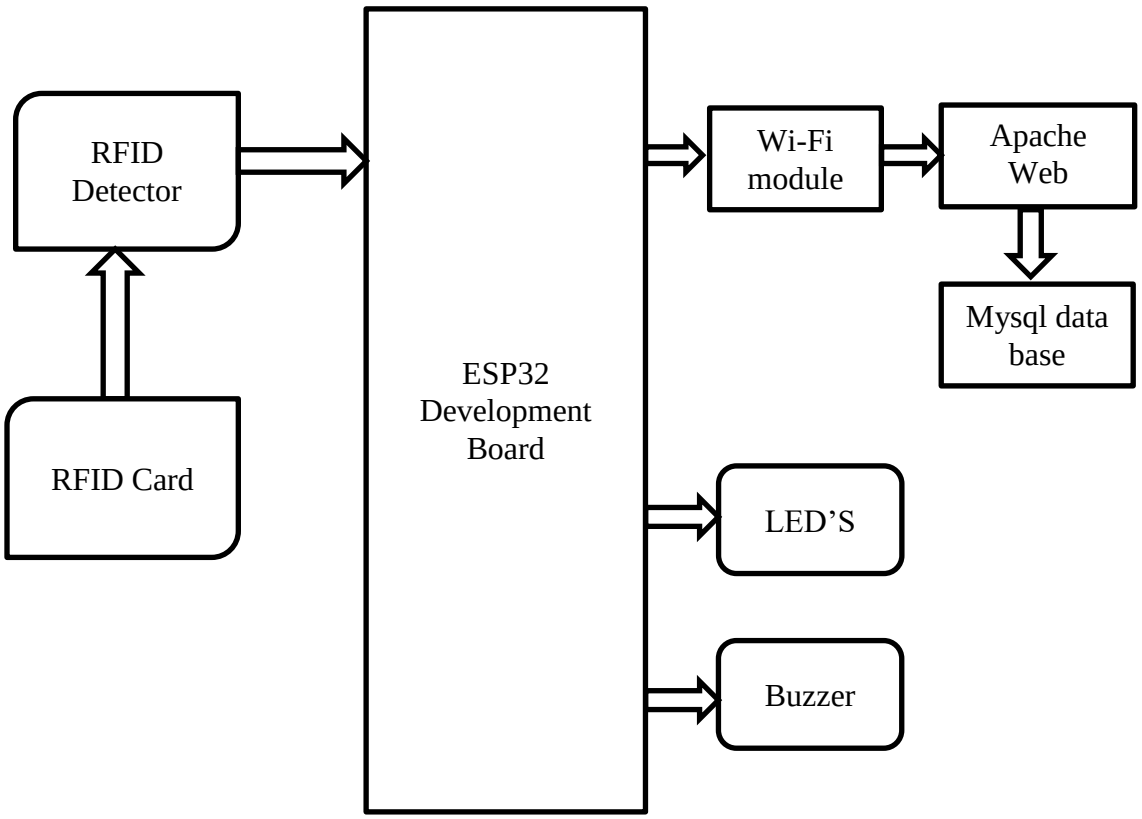

Figure 3.1: Architecture diagram of the proposed system

The student approaches to borrow the book or return it to the counter. First the students have to identify themselves using the RFID cards they are given. RFID reader to read card to make an entry in the database. The worker gathers the book and reads the card during book return.And all information regarding borrow and return is maintained in the database for which an user interface is designed.

3.1 System Modules

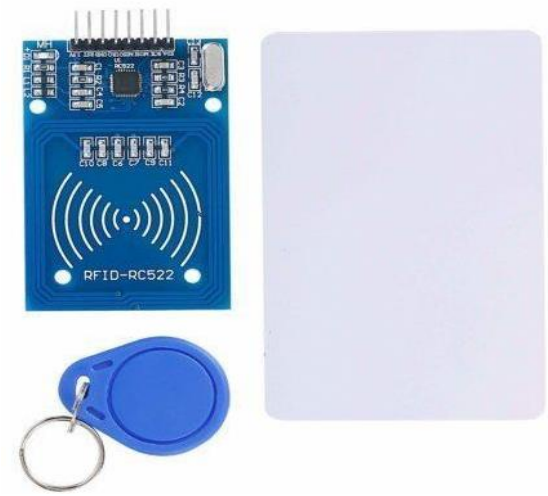

Figure 3.1.1 RFID Reader and Tags

3.2 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. The ESP 32 is an Ethernet-to-Wi-Fi development board that enables Ethernet devices to be interconnected over Wi-Fi. At the same time, to provide more flexible power supply options, the ESP32-Ethernet-Kit also supports power over Ethernet (PoE).

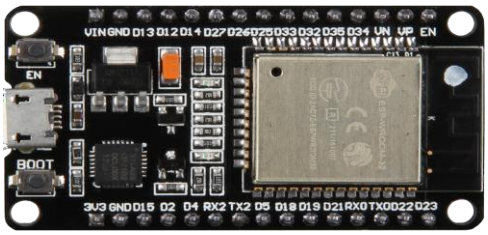

Figure 3.2.1 ESP32 KIT

3.3 Wi-Fi Network

Data collected from sensors needs to be uploaded to remote server; it is done using a WiFi network, it is required to mention ssid and password in the code to establish communication.

3.4 Webserver

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.

3.5 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..

3.6 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 support_ed as an open-source product. A PHP processor is now resident on most web servers.It is a serverside scripting language .PHQP is of course used for kind managing and information entrée. informationentrée 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 XHTML document that has PHP script, the net server that gives the document includes PHP script by the extension. once the PHP processor finds XHTML code it input data, it merely copies it to the computer file

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 wont to give interfaces to different software package like mailand info system.

3.7 Use case diagram

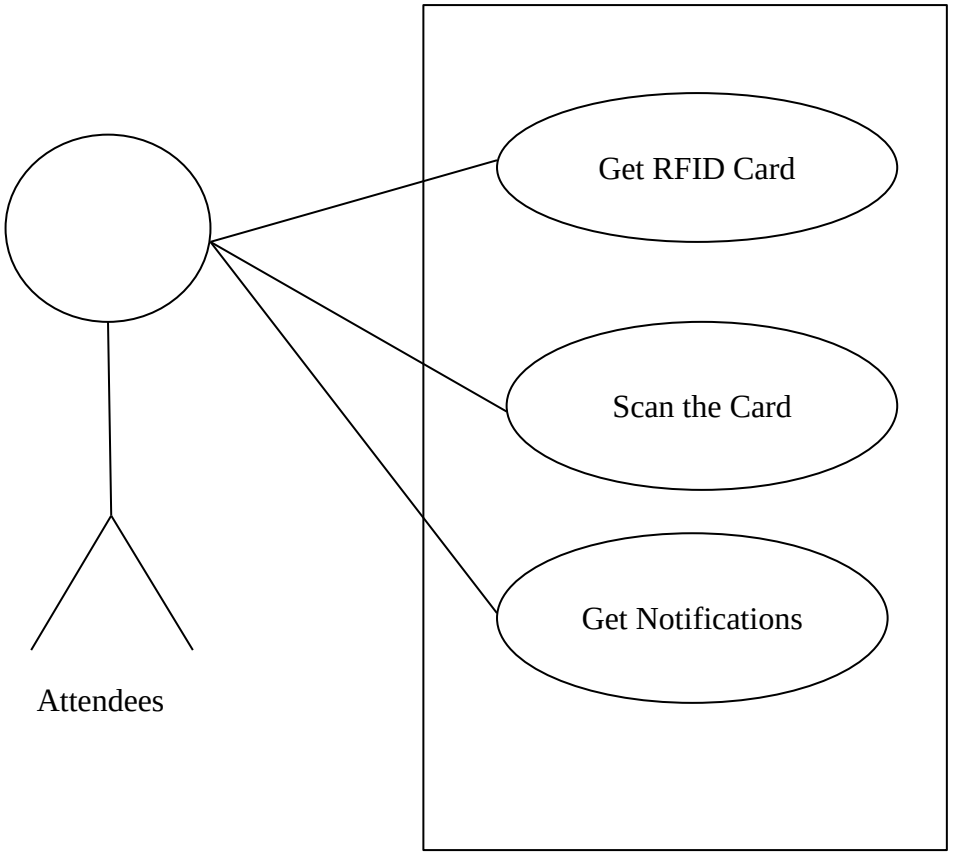

Figure 3.7.1 : Use case diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. When a user presents his/her tag, the module identifies the user and ask him to present the books. Next ,the module receive the detected books tags from the reader. After that, the module issues a query to the database to determine the legibility .If the borrowing operation is allowed, the module displays the name of each book and its legitimacy for borrowing to the operator through graphical user interface.

Chapter 4

SYSTEM REQUIREMENTS SPECIFICATION

4.1 SOFTWARE REQUIREMENTS

C++

Figure 4.1.1: C++

C++ is widely used in embedded systems software engineering. It's also popular in communications and gaming. It is used in many other industries: health care, finances, and even defense. One reason that programmers opt for C++ is that it interfaces well with other languages. Another plus is that it is high performance. C++ is one of the world's most popular programming languages. It can be found in today's operating systems, Graphical User Interfaces, and embedded systems. It is an object-oriented programming language which gives a clear structure to programs and allows code to be reused, lowering development costs. It is portable and can be used to develop applications that can be adapted to multiple platforms.

PHP

Figure 4.1.2: PHP

PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML. It is also a general-purpose language that you can use to make lots of projects, including Graphical User Interfaces (GUIs).

ARDUINO IDE

The Arduino Integrated Development Environment contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. The Arduino Software (IDE) makes it easy to write code and upload it to the board offline. We recommend it for users with poor or no internet connection. This software can be used with any Arduino board.

Figure 4.1.3: Arduino IDE

MYSQL

MySQL is an open-source relational database management system (RDBMS[1] Its name is a combination of "My", the name of co-founder Michael Widenius's daughter. and "SQL", the abbreviation for Structured Query Language. A relational database organizes data into one or more data tables in which data may be related to each other; these relations help structure the data. SQL is a language programmers use to create, modify and extract data from the relational database, as well as control user access to the database. In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to implement a relational database in a computer's storage system, manages users, allows for network access and facilitates testing database integrity and creation of backups.

Figure 4.1.4:MySQL

4.2 HARDWARE REQUIREMENTS

Processor

Figure 4.2.1: Processor

A processor is a integrated electronic circuit that performs the calculation that run a computer. A processor is the logic circuitry that responds to and processes the basic instructions that drive a computer.

RAM

Figure 4.2.2: RAM

Random access memory (RAM) is a computer's short-term memory, where data that the processor is currently using is stored temporarily. RAM memory can be accessed much faster than data on a hard disk, or other long-term storage device, which is why RAM capacity is so important for system performance. RAM isn't actually where the data gets processed. Ultimately, the data has is moved into cache, which is a small pool (often just a few Megabytes) of very fast memory actually built into the processor itself.

Hard Disk

Figure 4.2.3: Hard Disk

Hard Disk is also called a hard drive, HDD (Hard Disk Drive), Fixed Disk. It is used as a secondary storage device, they are a non-volatile memory (Data is not lost when power is off) They are the cheapest and faster device that is used for data storage.

RFID ID Card

Figure 4.2.4: RFID ID Card

RFID Card are small devices consists of an electronic microchip embedded inside and an antenna. The microchip has the unique identification number of the RFID Card. Smart cards are used by nearly all businesses today, including to accept debit and credit cards and to restrict access to certain facilities. Smart cards are an easy-to-use, reliable, and safe technology used to securely identify and authenticate a cardholder, which makes them ideal for businesses that want to share confidential data easily and securely. If you're thinking about using smart cards at your business, read on to learn about how smart cards work, the different types of smart cards that are available, and the benefits and risks of this technology.

.

RFID Detector

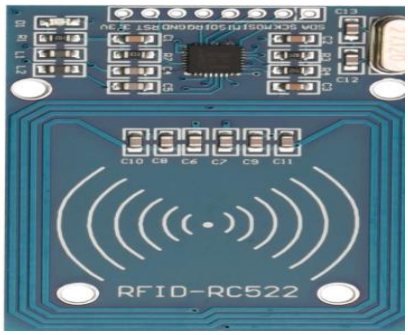

Figure 4.2.5: RFID Detector

RFID detector is one of the significant hardware component in the RFID system which read information from the RFID devices/tags and connected to the network to transfer the information to the database.

Jumper Wires

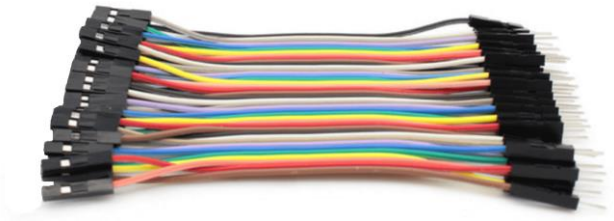

Figure 4.2.6: Jumper Wires

Jumper wires are simply wir**es** that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.

CHAPTER 5

IMPLEMENTATION

In this project this IDE is used to write, test and deploy C code to hardware circuit , program written using this IDE are called as sketch, each sketch is written in C or C++, this ide allows to communicate with the circuit boards connected to USB port of the development computer.

Figure 5.1: Arduino IDE Interface

Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension .ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino Software (IDE), including complete error messages and other information. The bottom righthand corner of the window displays the configured board and serial port.

The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

The Arduino Software (IDE) uses the concept of a sketchbook: a standard place to store your programs (or sketches). The sketches in your sketchbook can be opened from the File > Sketchbook menu or from the Open button on the toolbar. The first time you run the Arduino software, it will automatically create a directory for your sketchbook. We can view or change the location of the sketchbook location from with the Preferences dialog. Libraries provide extra functionality for use in sketches, e.g. working with hardware or manipulating data. To use a library in a sketch, select it from the Sketch > Import Library menu. This will insert one or more #include statements at the top of the sketch and compile the library with your sketch. Because libraries are uploaded to the board with your sketch, they increase the amount of space it takes up. If a sketch no longer needs a library, simply delete its #include statements from the top of your code.

Serial Monitor displays serial sent from the Arduino board over USB or serial connector. To send data to the board, enter text and click on the "send" button or press enter. Choose the baud rate from the drop-down menu that matches the rate passed to Serial.begin in your sketch. Note that on Windows, Mac or Linux the board will reset (it will rerun your sketch) when you connect with the serial monitor. Please note that the Serial Monitor does not process control characters; if your sketch needs a complete management of the serial communication with control characters, you can use an external terminal program and connect it to the COM port assigned to your Arduino board.

5.2 Flow chart

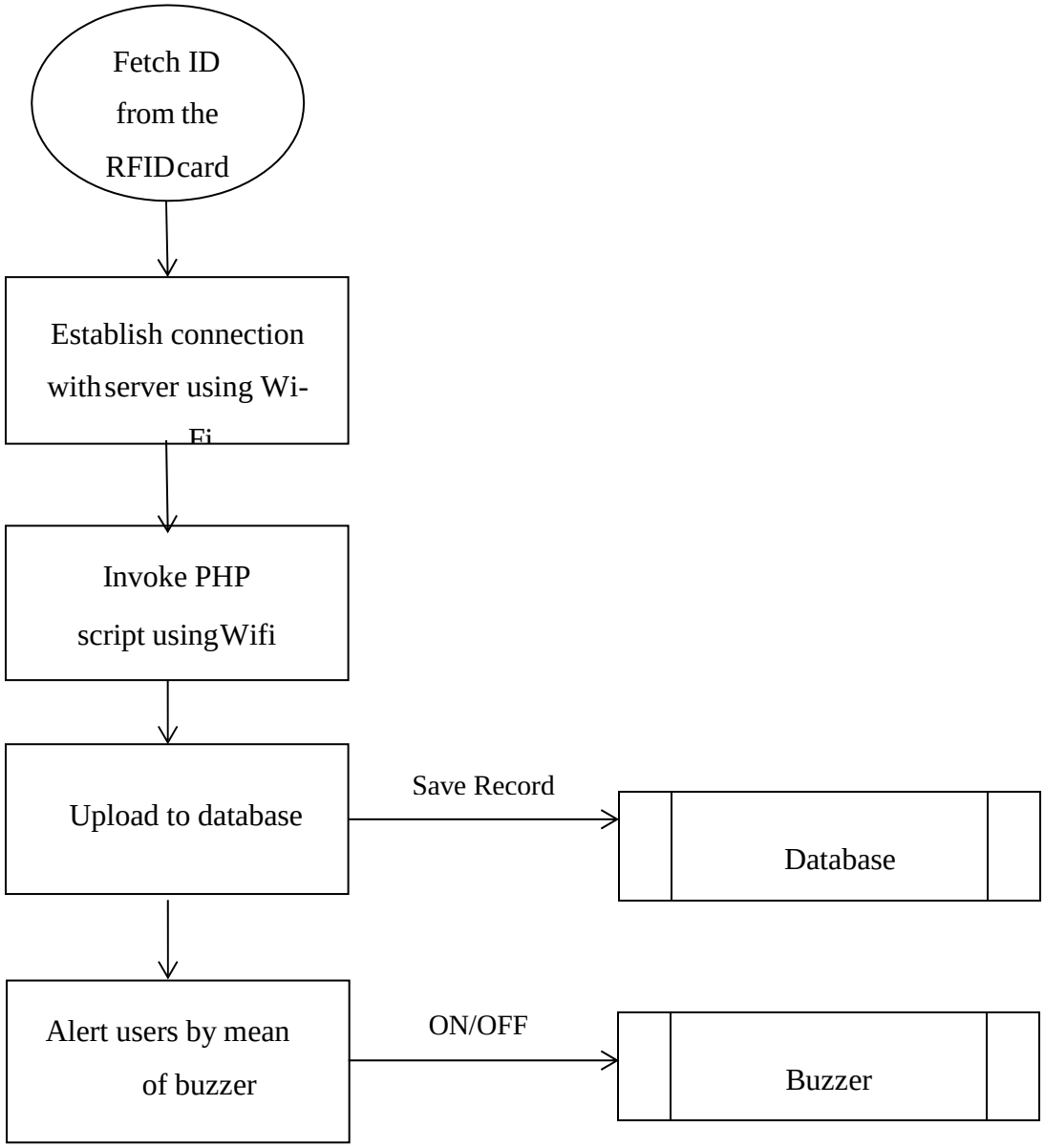

Figure 5.2.1: Data flow diagram

A data flow diagram shows the way information flows through a process or system. It includes data inputs and outputs, data stores, and the various sub processes the data moves through. DFDs are built using standardized symbols and notation to describe various entities and their relationships. Using RFID in libraries saves library staff's time by automatizing their tasks.

An establishment that uses RFID library management saves a book reader, precious time that he would have been spent, waiting for his turn in a queue for borrowing or returning a book. Taking care of books and making them available to the book readers are important tasks. Most of the library staff's time is spent in recording information of incoming and outgoing books.

Borrowing and returning of books can be fully automatized with the help of self check-in/out systems. This system involves installation of special software. A person using this system to borrow books, is presented with options on a computer screen. The person has to identify himself with a code, which is preferably a personal identification number, or any form of unique identity code. Books selected by the person are identified by the system's built-in RFID reader. And, the surveillance bit in the book's tag is deactivated by the system. When a book is returned, the check-in/out system activates the surveillance bit.

Chapter 6:

RESULTS ANALYSIS

6.1 ESP 32 board

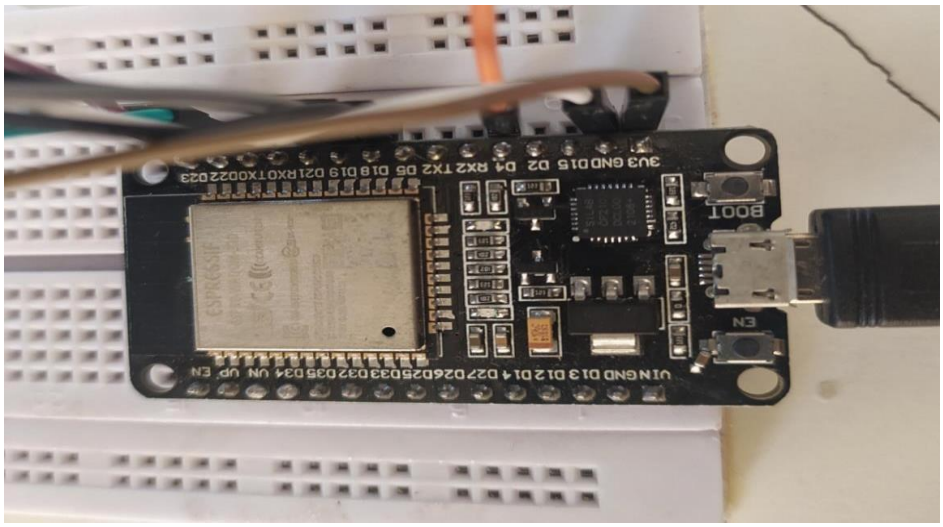

Figure 6.1.1;ESP32 KIT board and connection

6.2 RFID Reader

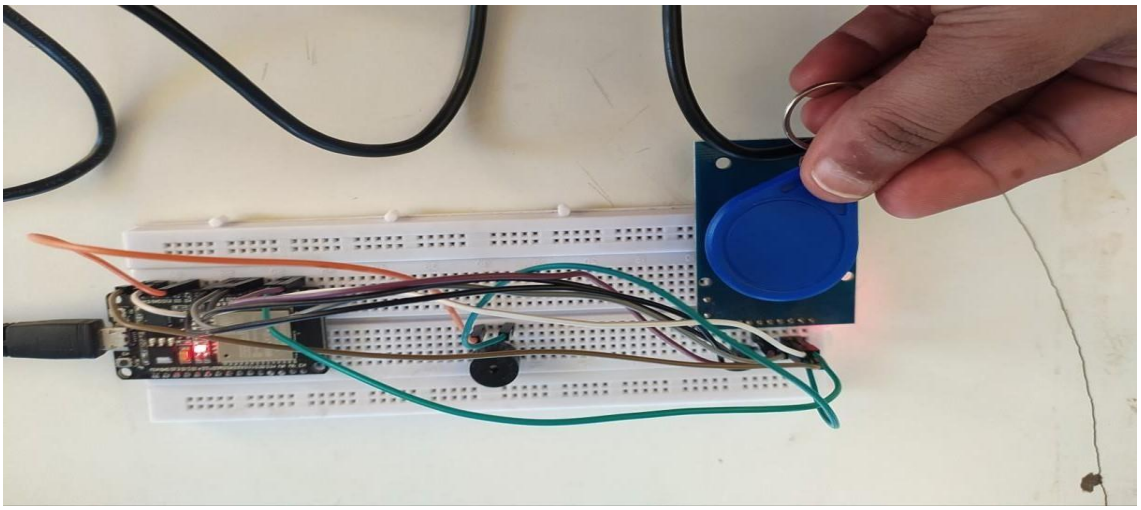

Figure 6.2.1 :RFID Reader and connections

6.3 Admin page

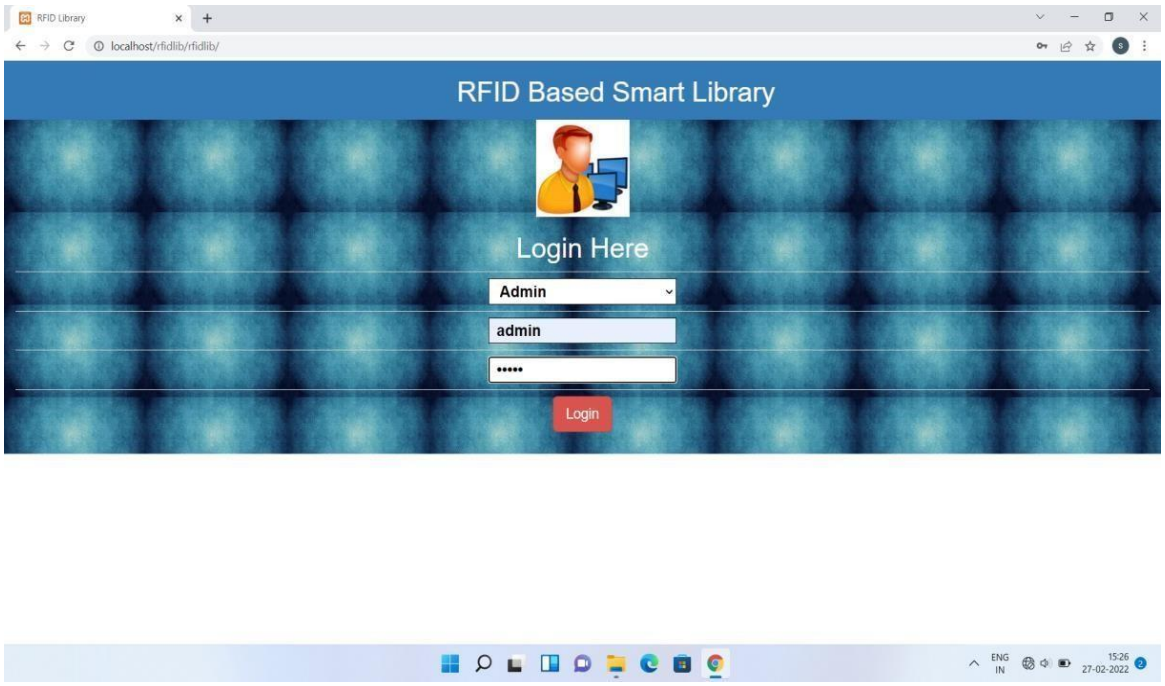

Figure 6.3.1: Admin page

The Figure 6.3.1 shows that it is a admin page i.e it is the interface of staff incharge in library. Admin can set the user name and password as per there wish.

6.4 Home page

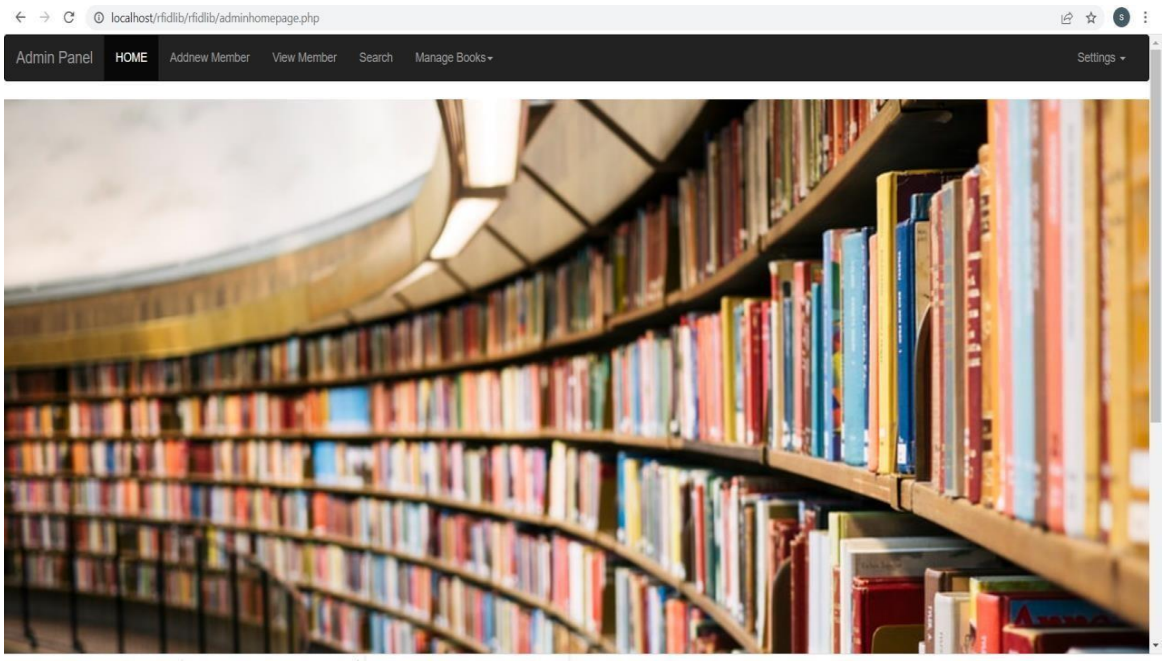

Figure 6.4.1 : Home page

6.5 Add new member page

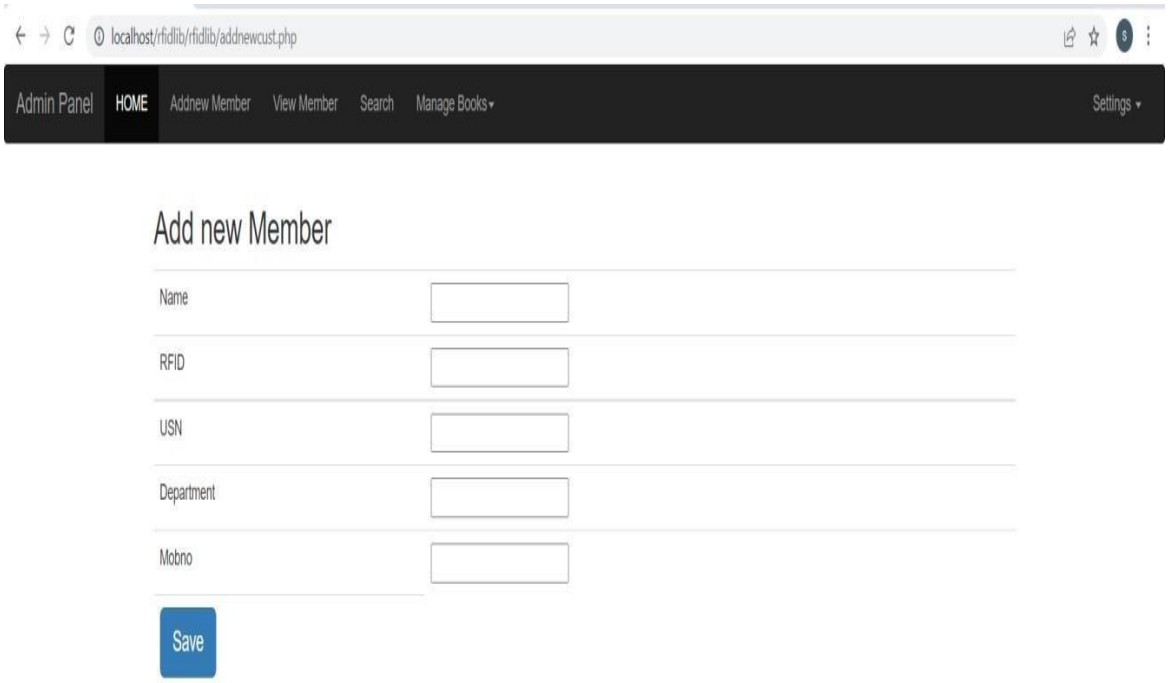

Figure 6.5.1: Add new member page

The Figure 6.5.1 shows that the admin can add the new student with their details like name, USN, RFID card number, department etc. After filling all the required details of the student, it will be saved in the databases.

6.6 View member page

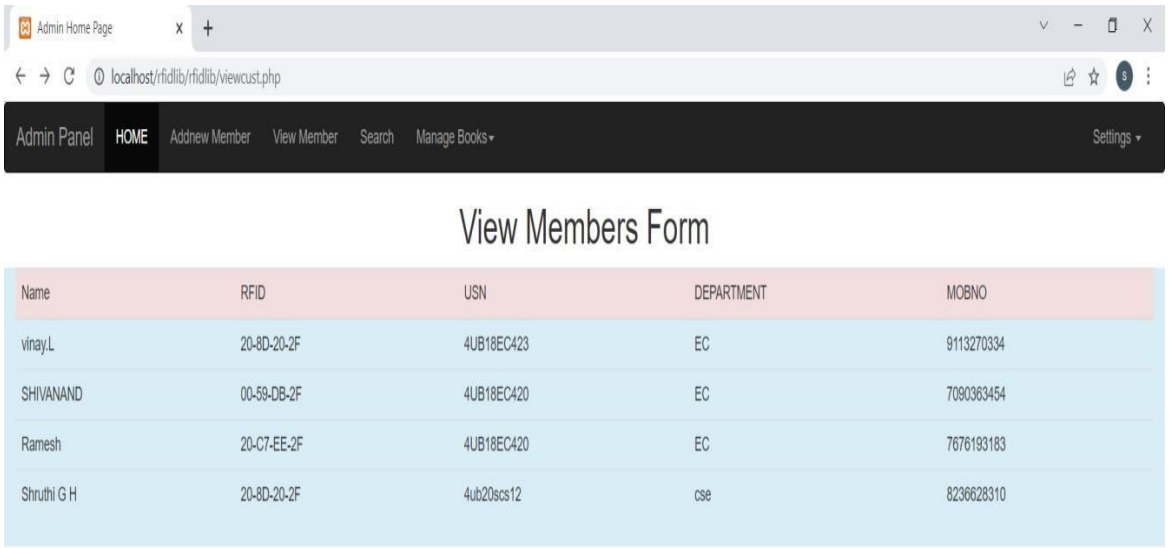

Figure 6.6.1 : View member page

The Figure 6.6.1 shows that the admin can see the record of the students added in databases and also about their other details ad entered before.

6.7 Add New Book

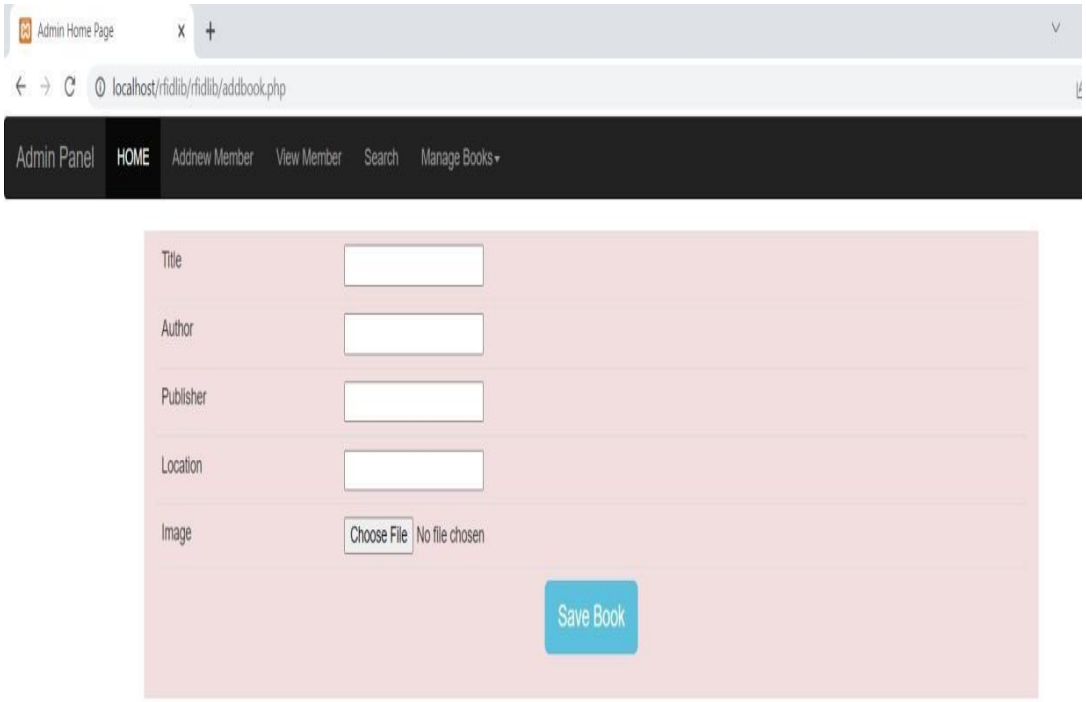

Figure 6.7.1 : Add new book

The Figure 6.7.1 shows that the admin can add the new book in this interface by filling details of the book such as title, author, publisher, and image of the book so that it will be easy for students to select the book of their choice.

6.8 View Book page

The admin can add the new books here, with other details of the book.And can add the book as per availability in library. The admin can set the book according to the department of studying. So that it will be easier for the students to find the books.

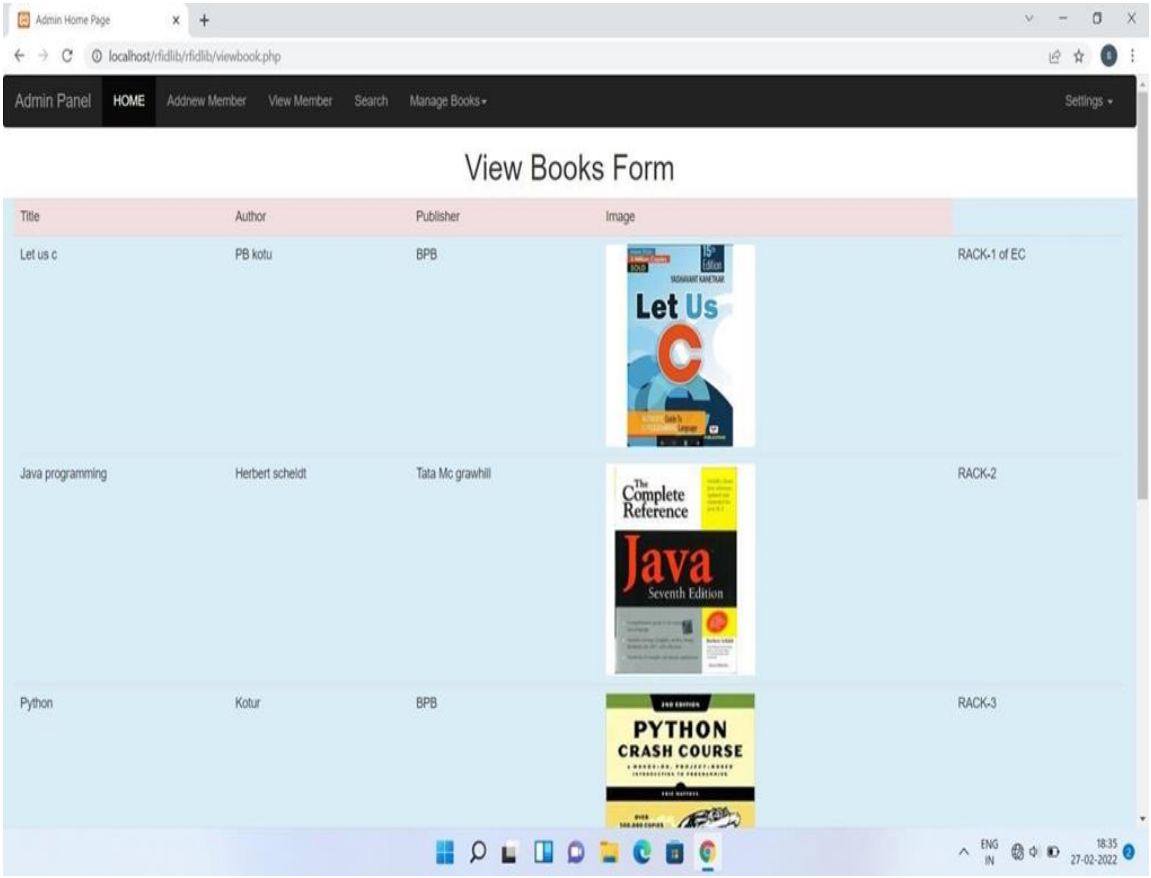

Figure 6.8.1: View Book page

The Figure 6.7.1 shows that the students can see the books available in the library and select according to their choice and add to the cart option available.

6.9 Scan page

Instead of swiping card and providing information through the magnetic strip on the back, RFID cards transmit your payment details via radio frequency. With a tap or wave, students can make purchases without entering a PIN or waiting for the chip reader. So now student can scan their card provided to them before.

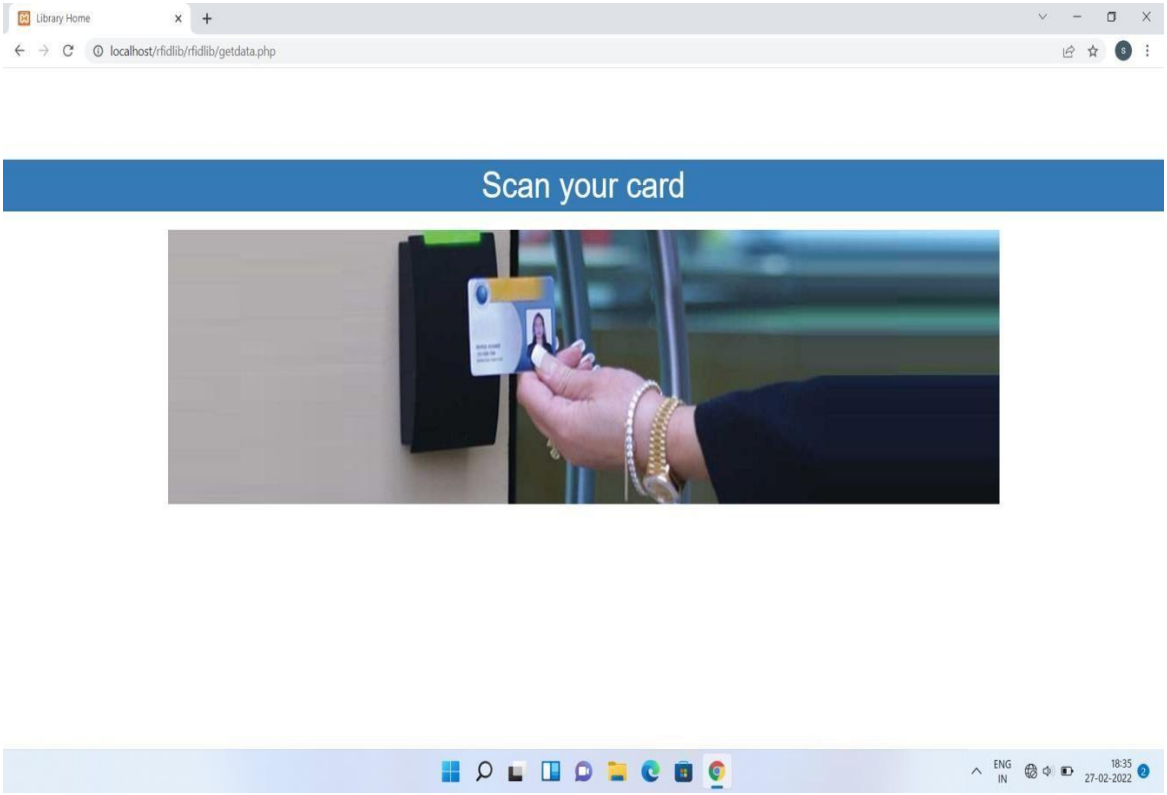

Figure 6.9.1 : Scan page

The Figure 6.7.1 shows that the student can scan the card that has been provided to them with their details, against the RFID Reader.

7.0 Student book cart

After scanning the card a new page is opened in the student end. All the available books are showed in this interface. Now the student can select the book of their choice by seeing all the details of the book like author name, publisher etc. Libraries that use RFID technology reduce not only staff workload but also reader wait times. It ensures that every book is returned to its proper location after reading and minimizes waiting time, allowing other library users to use the facility.

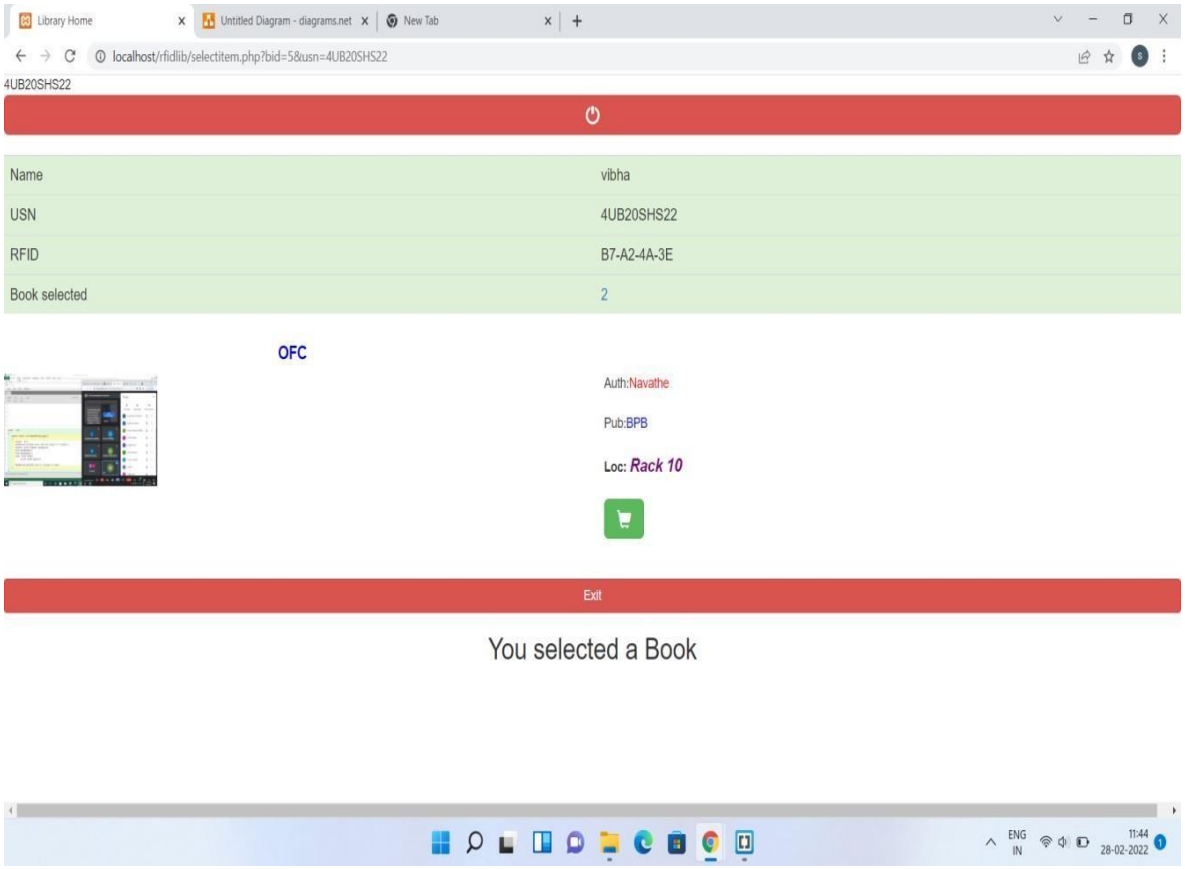

Figure 7.0.1: Student book cart

The Figure 7.0.1 shows that the student can add the book of their choice to the cart.After this the admin (staff incharge) will get to know about this that the student has selected the particular book.Now the admin can issue ithe book to the student.And also give the permissible time to return the book.if the student return that book within the given time then there is no fine for him/her.Otherwise the fine is applied.

7.1 Book Issue Page

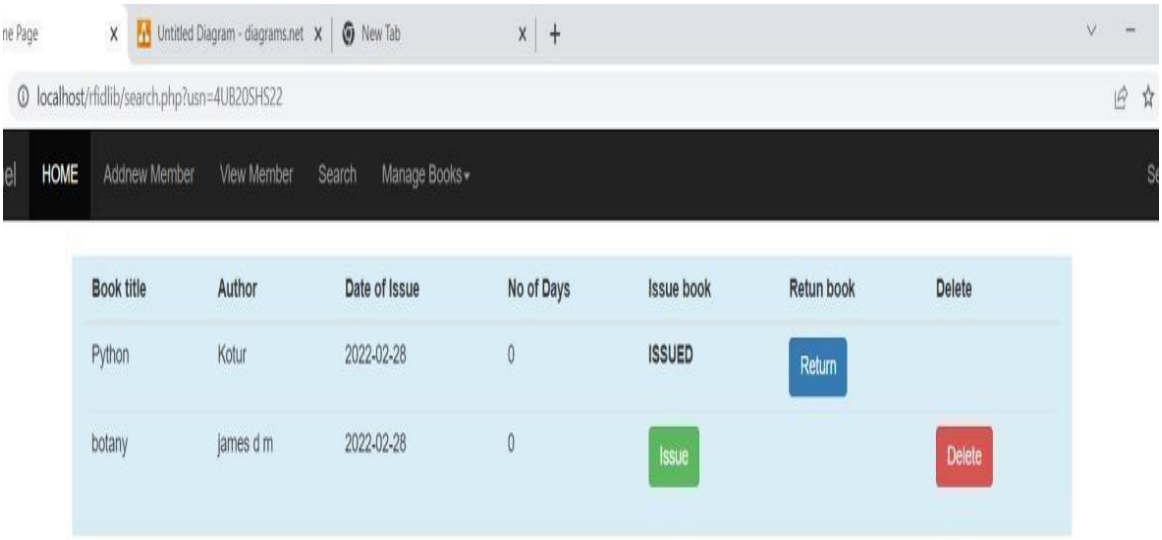

Figure 7.1.1 : Book issue page

The Figure 7.1.1 shows that the admin can issue the book to the student. If the student can return the book then the admin marked it as return. Here in the figure shown the Python book is issued to the student but not yet returned and Botony book is not yet issued.

CHAPTER 7

ADVANTAGES AND DISADVANTAGES

7.1 ADVANTAGES

- Increase attention from library staff.
- Ease and fasten check-in and check-out.
- Reduce workload on library staff.
- Ensure security.
- Increase efficiency and reduce cost.

7.2 DISADVANTAGES

- Expensive.
- RFID tags are bigger than labels of barcodes.
- Tags are unique to the programme. No one tags suits all.

Chapter 8:

APPLICATIONS

- Book Drops
- RFID Transponder or Tagging
- Counter Station
- The Patron self-check-out station
- Shelf Management
- Anti-theft Detection
- RFID tags replace both the EM security strips and Barcode.
- Simplify patron self check-out / check-in.
- Ability to handle material without exception for video and audio tapes.

Chapter 9

CONCLUSION AND FUTURE SCOPE

9.1 CONCLUSION

RFID technology is not only emerging but also more effective, convenient and cost efficient technology in library security. This technology has slowly begun to replace the traditional bar-code on library items. The RFID tag can contain identifying information such as a book's title or material type, without having to be pointed to a separate. The information is read by an RFID reader, which replaces the standard barcode reader commonly found at a library's circulation desk. The RFID tag found on library materials. It may replace or be added to the barcode, offering a different means of inventory management by the staff and self service by the borrowed. It can also act as a security device, taking the place of the traditional electromagnetic security strip. And not only the books, but also the membership cards could be fitted with an RFID tag. The cost of the technology is main constraint.

9.2 FUTURE SCOPE

RFID has many advantages over barcodes, but barcodes have become a standard in many industries for many worthwhile reasons. Depending on the application, either system will have its strengths and weaknesses. When it comes time for you to make a decision between either system, keep the initial and recurring costs in mind, as well as the potential return on your investments. In years past, implementing a full-scale RFID system was cost prohibitive for small to mid-size companies, but today, the difference in the cost of a new barcode system versus an RFID system may be minimal in certain applications. Also, investing in an RFID system may pay for itself over time due to potential increases in efficiency and decreases in errors. With an RFID system, several benefits that can be achieved with RFID solutions: Though RFID is not likely to entirely replace commonly used barcodes in the near future, the following advantages suggest to additionally apply RFID for added value of identification: Tag detection not requiring human intervention reduces employment costs and eliminates human errors from data collection, As no line-of-sight is required, tag placement is less constrained, RFID tags have a longer read range than, e. g., barcodes,

REFERENCES

[1] Shaini Gopinath, Hauwa and Bagudu, RFID in Libraries: a case study on implementation, 2018, 1(4),249-252.

[2] Hilal Ahmad, "usage and effectiveness of RFID technology" in Allama Iqbal Library, 2016, vol. 52,no.4, pp. 109-120.

[3] Palmer, "Making the most of RFID in Libraries, 2009, pp. 160.

[4] Mamdapur, G.M.N. & Rajgoli, "Implementation of Radio frequency Identification technology in libraries: Advantages Research and disadvantages".Int. J. Lib. Inf. Sci. 2018.

[5] Shahid, " Use of RFID Technology in Libraries: A new approach to Circulation, Tracking" , 2005, vol.8.

[6] Hadro, "Revisiting RFID in Libraries" , vol. 134, 2009, pp. S1-S2.

[7] Tseng , S . and Pin-dar K, " A Study on the Patronage of Intelligent Library", 2009, pp. 410-429.

[8] Engel, E. "RFID implementation in California libraries: Cost and Benefits", 2006.

[9] Dwivedi, K. K. Kapoor, S. D . Williams and J. Williams, "RFID system in Libraries" , 2013vol. 33, no.2, pp. 367-377.

[10] Renold, A. P. and Rani, R. J, " An Internet based RFID Library management system" ,2013, pp. 21-26.

[11] Hui, Haung, H. Xu, X. A. Wang, "Design and Implementation of Library books search and management system using RFID technology", 2013, pp.392-397.

[12] Ajami, S. and Carter, M. W. The advantages and disadvantages of Radio frequency Identification technology, 29(1), 2013, pp. 443-448.

[13] Sandhu, "Awaking stock taking practice in academic libraries using Radio frequency Identification technology", 2012.

[14] N. Sugie, " Application of Radio frequency Identification technology to study library users-information-seeking behavior", 2013.

[15] Bansode, S.Y., Chikate, R, "Implementation of Radio frequency technology" in University of Pune Library,2014, pp. 103-105.