SMART LIBRARY MANAGEMENT SYSTEM USING RFID

Mini Project Report

Submitted in partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

In

ELECTRONICS AND COMPUTER ENGINEERING

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CERTIFICATE

This is to certify that the mini project report entitled **Smart Library Management System using RFID** is a bonafide record of project work carried out under my supervision by **D. Srinivas varma (21L31A1909), P. Yaswanth (21L31A1946), B. Sai Charan (21L31A1902), N. Bhanu Kiran (21L31A1936)** during the academic year 2023-24, in partial fulfillment of the requirements for the award of the degreeof Bachelor of Technology in Electronics and Computer Engineering Vignan's institute of information technology (Autonomous). The results embodied in this mini project report have not been submitted to any other University or Institute for the award of the Degree.

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DECLARATION

We hereby declare that the mini project report entitle **Smart Library Management System using RFID** has been carried out by us and has not been submitted either in part or whole for the award of the degree, this title is not used by any other university.

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ABSTRACT

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.

CHAPTER-1

INTRODUCTION

CHAPTER -1

1.1 INTRODUCTION

Every educational institute has the library and an existing library management system uses manual system and bar-code technology for accessing the book. But with largely increasing the number of books in the library it causes human error, consumes more time and become less efficient. It is important to digitalize the existing library and the problem of barcode technology. The drawback of the above-mentioned technology can be overcome by using RFID technology. There is a rapid development in this technology which has been used in various applications. RFID system helps inefficient collection, management and distribution of books.

It will track the books and makes issue/return of the book process easier. Database is created to store the information of the books available in the library, so that the user can access it for collecting the books. It helps to authenticate the registered user to avoid accessing from unauthorized user. GSM module is used to provide alert message for the registered user during return process. It is implemented with theft detection system to identify the theft action that take place in the library. RFID has three parts- a scanning antenna i.e., RFID reader, a transceiver and a transponder i.e., the RFID tag which is programmed with information and it is located on the objects to be identified. The RFID technique uses electromagnetic coupling for data exchange between the reader/writer and the tag. When RFID tag passes near the area of scanning antenna, it detects the signal from antenna and the chip get activated and transmits the information. The proposed system is more efficient and provides more easy option for the registered user.

A library is a growing system. The problems associated with the maintenance and securities are used to identify, track, sort or detect library collections at the circulation desk and in the daily maintenance. This system consists of smart RFID labels, hardware and software, provides libraries with more effective way of managing their data while providing greater service. The technology works through thin smart labels, which placed on the inside cover of each book in a library's collection. Manual interactions are not needed for RFID-tag reading. Utmost care is taken to provide following features to the Library using RFID technology to minimize the manual intervention and to minimize the manual errors and to provide fast issuing, reissuing and searching of books.

CHAPTER - 2
LITERATURE SURVEY

CHAPTER - 2

2.1 Literature Survey

Mohammed I. Younis et al. proposes a Smart library management system based on an RFID technology which is used to overcome the obstacles of sorting, lending, returning, tagging, eyeing of books. In addition, library users encounter problems for finding, borrowing, localising, renewing the borrowing, queuing, and so forth. Using low-cost passive tags in libraries reduces the cost of modernisation significantly. As such, integrating RFID into library management system makes both the library users and staff's task easy, smart, convenient, and practical[1].

H. Cheng, L. Huang, H. Xu, Y. Hu and X. A. Wang, et al. proposed RFID system based on RFID technology and Wi-Fi wireless communication technology and designed a corresponding handheld device client software to realize a visual book search and management system. This system can not only greatly improve the efficiency of book search and management but also save the manpower and material resources to a large extent, which has a practical application value[2].

J. F. Zhang and C. J. Wen, et al. introduces the function and the use of each module in the system which emphatically studies the label conversion subsystem and self-help borrowing book subsystem. 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 of this paper 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[3].

Gannamraju, Phani, Satyanarayana Yarramsetti, and L. S. Kumar, et al. proposed a smart library system which uses RFID tag, RFID tag reader, ESP8266, and back-end database that store the required content. It automates the issue and return of books with minimum human intervention. The designed library portal gives the availability of a variety of library resources, book transaction information, and fine details for both students and staff. The data analysis of book transaction details is done and data visualisation is also made available to both user and admin[4].

Malipatil, Nivedita, et al. proposed "RFID based library management system." which helps to identify the large number of tagged books using radio waves. The database shows the availability of the book in the library so that the student can search in the database and if available, they can collect book from the library. It helps to handle the issue, renewal and return process via RFID tags easily. Student will get notified about the due date of book using GSM. If the student failed to return the book after the due date corresponding fine will be generated based on the time period. RFID EAS system is used for theft detection at the library[5].

Grover, Priyanka, and Anshul Ahuja, et al. proposes RFID Based Library Management System that would allow fast transaction flow and will make easy to handle the issue and return of books from the library without much intervention of manual book keeping. 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[6].

C. Jayawardena, S. Reyal, K. R. Kekirideniya, G. H. T. Wijayawardhana, D. G. I. U. Rupasinghe and S. Y. R. M. Lakranda, et al. proposes a system which handles basic library functions such as issuing books, returning books, reserving books, collecting late return fines, antitheft detection, and managing booking inventory using IoT technologies such as RFID and Raspberry Pi. The first key criterion is shelves management, which provides a unique key and uses RFID technology to identify and arrange the books. The succeeding category is providing users with book recommendations by penalizing hidden layer activations to encourage only a few nodes to activate when a single sample is an input. The dimensionality reduction neural network method was used to select the optimal seating arrangement. The LSTM algorithm will be used to make predictions to provide an efficient service to library users[7].

A. P. Renold and R. J. Rani, et al. proposes "An internet based RFID library management system," in which the RFID reader Motorola 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 which has a dedicated, unique EPC (Electronic Product Code) which is made in relation to the database for the further details. Internet concepts are put forward with the help of 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 which was observed to be the most common issue. In this paper the problems & issues faced in the library environment like locating the mis-placed or mis-shelved book or materials, reducing the manual work & ease access of the books are done and a solution is developed that could overcome these problems with the better enhanced work[8].

Akter, Munmun. et al. proposed SMART LIBRARY MANAGEMENT SYSTEM (SLMS) USING RFID TECHNOLOGY, in which the performance of RFID reader motion and tags allows fast transaction flow and easily handling the process like references borrowing from library can be done using RFID technology and users will get notified using Global System for Mobile. Two big issues have been exposed and tried to find the best solution for them, first is the management process of any library, from user management to shelving system and the second one is the data and reference security. The results show that the system can quickly find the references that bookworms hid, and the references are not timely put back on the shelves. Furthermore, the new library hall design and IoT-based system improve the security[9].

I. Markakis, T. Samaras, A. C. Polycarpou and J. N. Sahalos, et al. proposed an intelligent Library Management System (LMS) based on the emerging UHF passive RFID technology is currently being designed in order to replace a traditional barcode system at the university's library. Primary objectives of the design include maximization of tag readability, localization of tagged items in the smart bookshelf, reduced spill-over energy to nearby shelves, and minimization of the Specific Absorption Rate (SAR) to nearby library users. Different types of shelf antennas were used and tested including evanescent-type antennas as well as far-field antennas. The antennas were designed, simulated, built, and tested in a realistic environment. HFSS and SEMCAD-X were used to evaluate radiation parameters and illustrate the radiation effects of near- and far-field antennas in the presence of the cabinet and library users[10].

CHAPTER-3

HARDWARE COMPONENTS

CHAPTER - 3

3.1 HARDWARE REQUIREMENTS

The required components are given below.

- Arduino Uno
- RFID reader
- RFID card /tag
- Connecting wires
- Breadboard

3.2 COMPONENT DESCRIPTION

i) Arduino Uno: ATmega328P Microcontroller:

The microcontroller is the brain of the Arduino Uno. It is an 8-bit AVR microcontroller with 32KB of flash memory, 2KB of SRAM, and 1KB of EEPROM. It handles program execution and controls the board's behavior.

Digital Input/Output (I/O) Pins: The Arduino Uno has a total of 14 digital I/O pins. These pins can be configured as either inputs or outputs and can be used to read digital signals from external devices or send digital signals to control other components. Analog Input Pins: The Arduino Uno has 6 analog input pins.

These pins can read analog signals from sensors or other devices that provide continuous voltage levels.

Power Pins:

5V Pin: Provides a regulated 5-volt power supply for powering external components or sensors.

V Pin: Supplies a regulated 3.3-volt power output for low-power components or sensors.

Vin Pin: Accepts an external voltage input in the range of 7 to 12 volts, typically used when powering the Arduino Uno through an external power source.

GND Pins: Multiple ground (GND) pins are available on the board, which serve as the reference for the electrical circuit.

USB Connector: The USB connector allows you to connect the Arduino Uno to a computer for programming the microcontroller and establishing serial communication with other devices.

Power LED: An LED connected to pin 13 indicates whether the Arduino Uno is powered on.

Reset Button: The reset button resets the microcontroller and restarts program execution.

Crystal Oscillator: The Arduino Uno utilizes a crystal oscillator (16 MHz) to provide precise timing for the microcontroller, ensuring accurate program execution and synchronization of operations.

ICSP Header: The In-Circuit Serial Programming (ICSP) header allows you to program the microcontroller using an external programmer or another Arduino board.

Voltage Regulator: The Arduino Uno includes a voltage regulator that ensures a stable supply voltage (5V or 3.3V) for the microcontroller and other components.

UART: The UART (Universal Asynchronous Receiver-Transmitter) interface enables serial communication between the Arduino Uno and other devices.

PWM Pins: The Arduino Uno has 6 Pulse Width Modulation (PWM) pins, denoted by a tilde (~) symbol. These pins allow you to generate analog-like output by varying the duty cycle of the digital signals.

The Arduino Uno ATmega328P, as shown in the figure 3.1 is used in our project.

Fig. 3.1 Arduino Uno: ATmega328P Microcontroller

ii) RFID Reader:

RFID tags are small electronic devices that contain an integrated circuit and an antenna. These tags can be attached to or embedded in objects, products, or even living beings. They come in various forms, such as adhesive labels, cards, key chains, or implants.

RFID Reader: The RFID reader is the device responsible for communicating with the RFID tags. Item its radio waves via its antenna, which power the tags and activate them. The reader then receives the response from the tags, which may include identification or sensor data.

Data Processing: Once the reader receives the response from the tags, it processes the data and can send it to a computer system or other connected devices. The reader may have built-in software or interfaces to integrate with external systems. The RFID reader as shown in the Fig. 3.2 is used to read or scan the card.

Fig. 3.2 RFID Reader

iii) RFID Card/Tag:

An RFID tag typically consists of several key components:

Microchip: The microchip, also known as the integrated circuit (IC) or the RFID chip, is the brain of the RFID tag. It stores and processes information such as a unique identifier (ID) or other data specific to the tagged item.

Antenna: The antenna is responsible for transmitting and receiving radio frequency signals. It is typically coiled or etched onto a substrate and is designed to resonate at the desired frequency. The size and shape of the antenna depend on the specific RFID tag type and its intended application.

Substrate: The substrate is a material on which the microchip and antenna are mounted. It provides support and stability to the components. Common substrates include flexible materials like polyester or paper for low-cost tags, or rigid materials like ceramic or glass for more robust tags. The RFID card as shown in the Fig. 3.3 is used to scan through RFID reader.

Fig. 3.3 RFID Card/Tag

iv) Connecting Wires :

Fig. 3.5 Connecting Wires

A connecting wire allows travels the electric current from one point to another point without resistivity. Resistance of connecting wire should always be near zero. Copper wires have low resistance and are therefore suitable for low resistance. The connecting wires as shown in the Fig. 3.5 is used to connect the components with one another.

v) Breadboard:

A breadboard, solderless breadboard, or protoboard is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable. The breadboard as shown in the Fig. 3.6 is used in our project to arrange the Arduino and RFID reader.

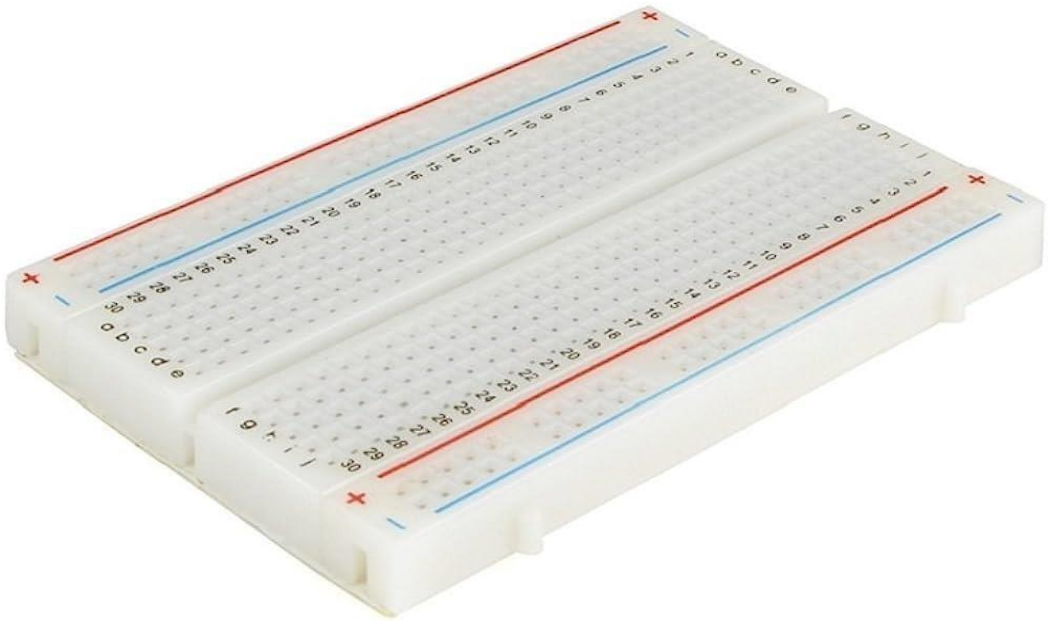

Fig. 3.6 Breadboard

3.3 SOFTWARE REQUIREMENTS

1. Arduino IDE (Integrated Development Environment) - Download and install the Arduino IDE from the official Arduino website (https://www.arduino.cc/en/software).

2. Arduino libraries - You will need to install the necessary libraries for the RFID reader module, LCD display, and servo motor. The required libraries can be found and installed using the Arduino Library Manager in the Arduino IDE.

3. Once you have the required components and software, you can follow these general steps to build the RFID anytime machine for the medical dispenser.

4. Connect the RFID reader module to the Arduino board following the pinout instructions provided with the module.

5. Connect the LCD display to the Arduino board using the appropriate pins.

6. Connect the servo motor to the Arduino board.

7. Connect the push buttons, LEDs, and buzzer to the Arduino board as required for user interaction and feedback.

8. Build or assemble the medication dispenser mechanism, ensuring it can be controlled by the servo motor.

9. Open the Arduino IDE and create a new sketch.

10. Import the necessary libraries for the RFID reader, LCD display, and servo motor.

11. Write the code to control the RFID reader, LCD display, servo motor, and other components. This would involve reading RFID tags/cards, displaying relevant information on the LCD display, controlling the servo motor to dispense medication, and providing feedback to the user through LEDs and buzzer.

12. Upload the code to the Arduino board.

13. Test the functionality of the RFID anytime machine, ensuring that it can read RFID tags/cards, dispense medication accurately, and provide appropriate feedback to the user.

3.4 LANGUAGE DESCRIPTION

EMBEDDED C LANGUAGE

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software. Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. These all device working is based on microcontroller that are programmed by embedded C.

In embedded system programming C code is preferred over other language. Due to the following reasons:

- Easy to understand
- High Reliability
- Portability
- Scalability

Function is a collection of statements that is used for performing a specific task and a collection of one or more functions is called a programming language. Every language is consisting of basic elements and grammatical rules. The C language programming is designed for function with variables, character set, data types, keywords, expression and soon are used for writing a C program. The extension in C language is known as embedded C programming language. As compared to above the embedded programming in C is also have some additional features like data types, keywords and header file etc.

CHAPTER-4

DESIGN & IMPLEMENTATION

CHAPTER 4

4.1 DESIGN & IMPLEMENTATION

The basic theme of this project involves issuing books that the user needs. A RFID Card is used as an input sensor. The input provided by the user through the buttons id then forwarded to the microcontroller for processing forward. The microcontroller with the motor drivers scans the required book that the user needs.

Methodology of Design:

Authenticating User:

- First the user has to register in a particular authorized center.
- The user can be provided with the user identity card (RFID).
- The user has to carry out the identification process to access the library.

The data flow diagram for the User Authentication Design was defined and included all the functionalities as shown in Fig. 4.1

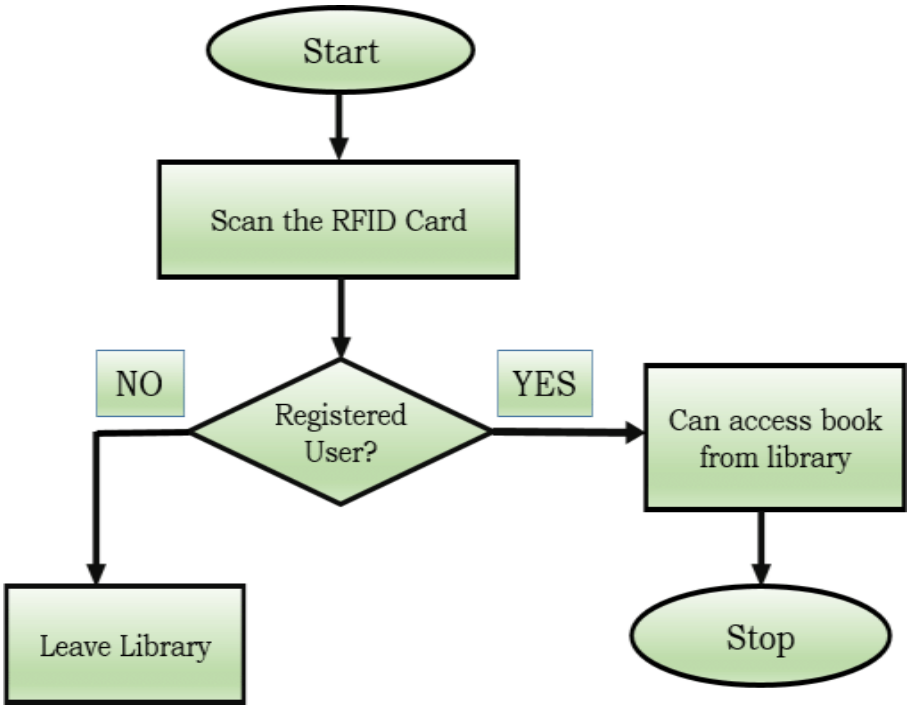

Fig. 4.1 User Authentication Design

- The tags used in this system are passive tags. RFID card is scanned, if it is valid then user can access the books from that particular library or else.

Automated Locating:

- Tagging is the important process in this RFID system. It stores the data of a book to which RFID tags are attached and rewrite without any help of contact and line of sight.
- All the books present in a library is embedded with RFID tags.
- The user cards and RFID readers are used to read these tags.
- Once the user borrows the book then the book is scanned information is uploaded to the database.
- After that the issue/push button is pressed.

Book Issue Process:

- After authentication is done, further process is enabled.
- Student searches the availability of required books from Library Database.

The data flow diagram for the Book issuing process was defined and included all the functionalities as shown in Fig. 4.2

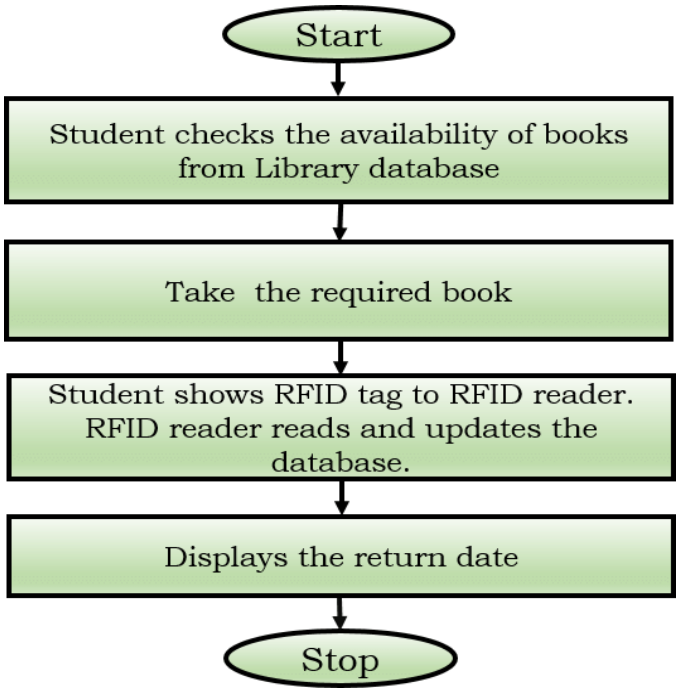

Fig. 4.2 Book issuing process

- If available, Student takes book.
- Student shows RFID tag to RFID reader.
- Reader reads and updates the database.
- Displays the Return date

Book Return Process:

- Student enters the library with book.
- Student displays the RFID tag to the RFID reader and places a book inside the tray.
- After a book is placed inside a tray, "Book Returned" message is displayed on the LCD and also the database is updated.
- Student exits from the Library after returning of books.

The data flow diagram for the Book returning process was defined and included all the functionalities as shown in Fig. 4.3

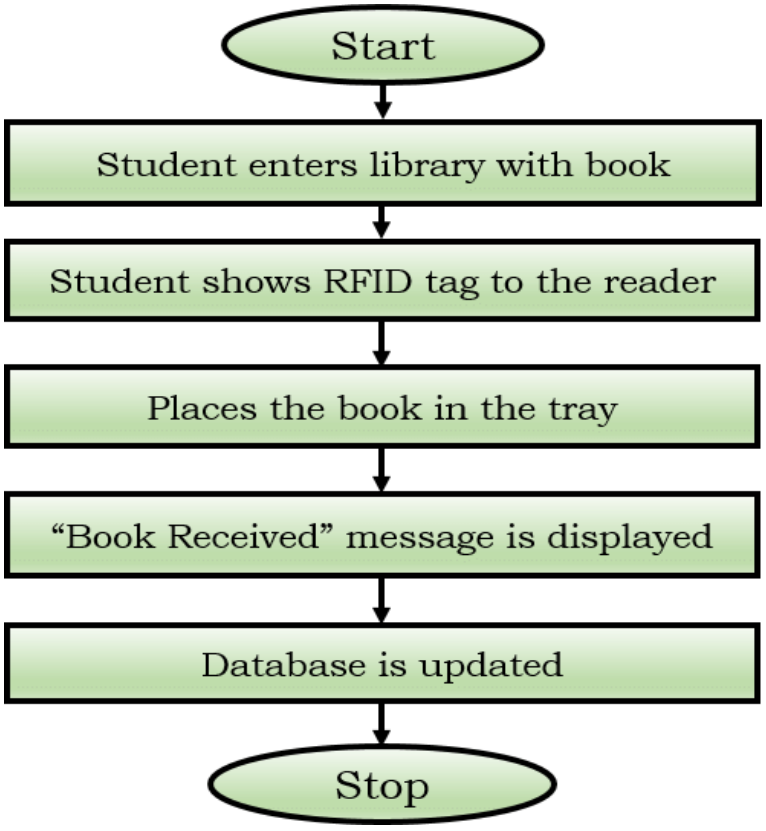

Fig. 4.3 Book returning process

Book Updating Process:

- Data stored in a tag provides an identification, storage location, loan status and history of the particular book.
- RFID tags are designed in such a manner that they can be placed on the library media, including books, CDs, DVDs and tapes.
- The librarian has to classify the books into groups and paste RFID tags on them. These tags help in tracking the books within the range of the RFID reader.
- The librarian has to login to the mat-lab software and update the information of availability of books, their location, issue and return of books information and the fine generated if the book returned after due date.
- These are the information which are uploaded to the database and can be monitored by the librarian.

The data flow diagram for the Book updating process was defined and included all the functionalities of hardware as shown in Fig. 4.4

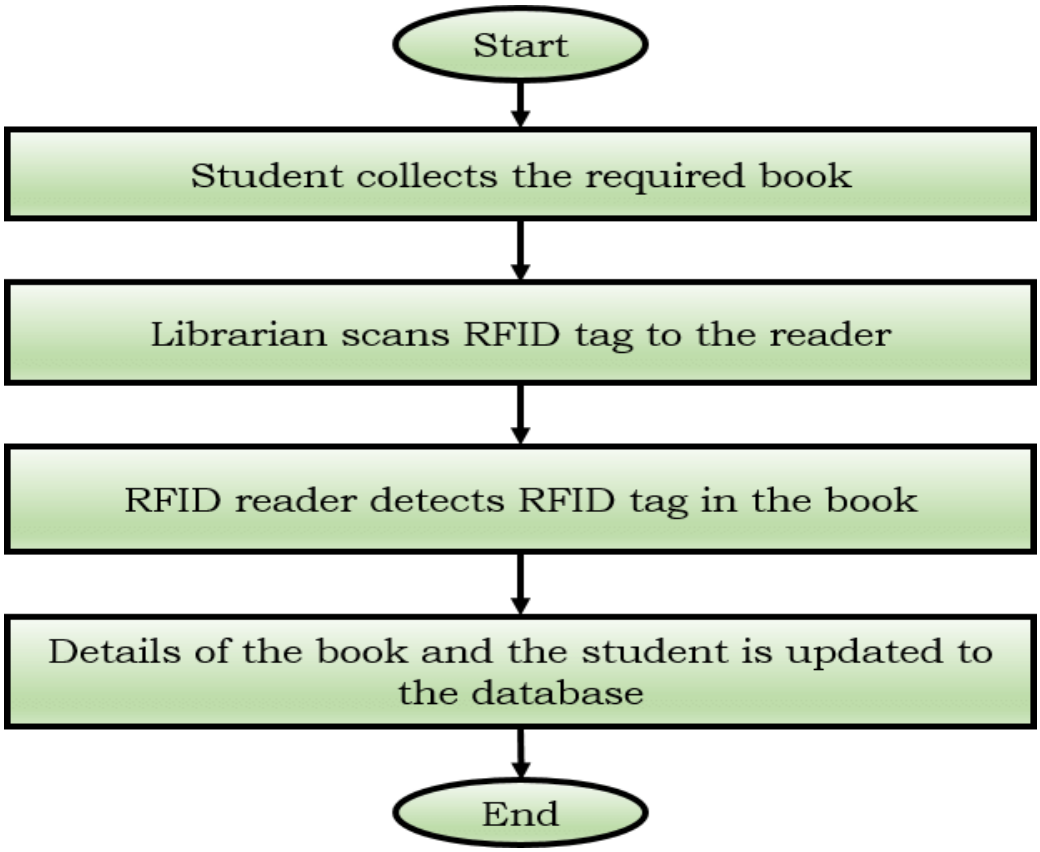

Fig. 4.4 Book updating process

4.2 HARDWARE DESIGN:

The Hardware Design of this system shows how the Arduino UNO is connected with the RFID Reader. The connections are as follows. The VCC of RFID is connected to the 3.3V of Arduino. Reset is connected to the pin number 9. GND is connected to the GND of Arduino.
The (Serial peripheral interface) SPI pins of RFID are connected with the SPI pins of Arduino board in the way as the RFID SCK is connected 13 of Arduino, MISO is connected to 12, MOSI is connected to 11 and SS is connected to 10.

The data flow diagram for the Hardware Design was defined and included all the functionalities of hardware as shown in Fig. 4.5

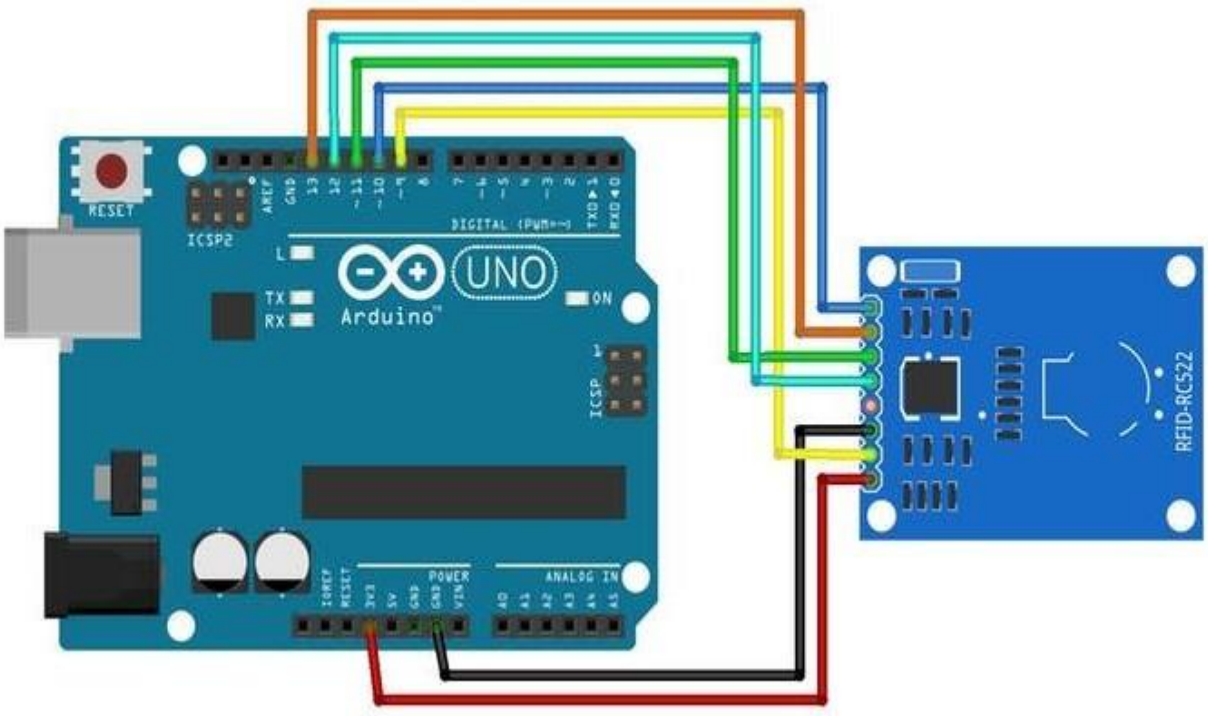

Fig. 4.5 Hardware Design

CHAPTER-5
HARDWARE MODEL

CHAPTER 5

5.1 HARDWARE MODEL

The Connections were done as shown in the Fig. 5.1. Based on these Hardware connections, we have implemented our System in which we used RFID reader to read the RFID card. The each user of the library is provided with separate cards that are used for the identification of the person to access the library materials. Once, the person enters the library he the swipe the RFID and which is given to him and the information regarding inventory of books in the library can be access by him. Once, the person did brings the book from the

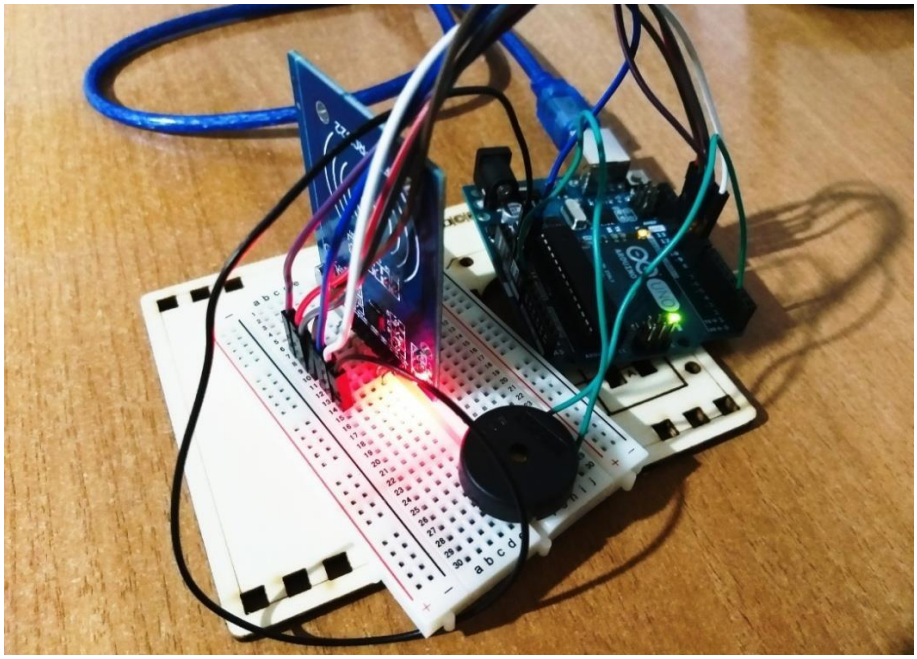

Fig. 5.1 Hardware Model

rack, the RFID and with is placed within the book is automatically detected and the book transaction is recorded. Thus both the searching of the book and the book transaction is made much more easier and simpler. Since the library consists of several menders of book, each book has be given a individual RFID tag and the tagging process has to be completed previously. The issuing of the RFID identity cards for the users also has to be given completed previously. The issuing of the RFID identity cards for users also has to be provided necessarily. During the transaction of the book, the user can be see the details regarding the transaction of the book such as the person hence for whom the book

is being issued, the book title, author name, book issue date and due date of the return also. Thus this helps both the administration and the user in easier transaction of the book. If the book is not returned within the due date then remainder message can also be forwarded for the book user. If the book is taken without registering then the buzzer sound at the exit gates can also be implemented.

5.2 RELATED WORK

It is a new generation of auto identification and data collection technology which helps to automate business processes and allows identification of large number of tagged objects like books, using radio waves. Libraries are essential parts of educational institutes that provide teaching resources and information. There is a loss of library resources due to the inefficiency of manual library systems which are not updating the information regularly. To improve the existing library management systems at the university level using radio frequency identification technology (RFID) and the internet of things (IoT). RFID is a fast emerging technology as it enhances authenticity and reliability. The proposed smart library system uses RFID tag, RFID tag reader, ESP8266, and back-end database that store the required content. It automates the issue and return of books with minimum human intervention. The designed library portal gives the availability of a variety of library resources, book transaction information, and fine details for both students and staff. The data analysis of book transaction details is done and data visualization is also made available to both user and admin.

RFID is a cutting-edge automated method for quickly classifying, arranging, and tracking a wide range of commodities. Today's RFID applications include automatic sorting, theft detection, and inventory tracking. In the near future, data gathering, identification, and analysis will be crucial for certain library activities. Radio frequency identification (RFID) technology is the dynamic link between people, things, etc. RFID-enabled automated libraries are transformed into "self-service stations" that require little assistance from library workers. By implementing self- service "check-in" and "check-out," major delivery delays for library resources are eliminated, and operational effectiveness is increased. It is mostly utilized in libraries to automate procedures for managing books, including circulation, inventory control, check-in, shelf management, and anti-theft. Combined with machinery for computer-assisted sorting. Sorting books is facilitated and accelerated using RFID. The material handling procedure at the library can be automated so that librarians can spend more time interacting with users, hence increasing "user interaction and satisfaction."

CHAPTER-6
SOURCE CODE

CHAPTER 6

6.1 CODE FOR SETTING UP ARDUINO UNO:

```
#include <SPI.h> // SPI
#include <MFRC522.h> // RFID
#define SS_PIN 10
#define RST_PIN 9

// Déclaration

MFRC522 rfid(SS_PIN, RST_PIN);

// Tableau contentent l'ID

byte nuidPICC[4];
const int buzzerPin = 2;

void setup()
{
        // Init RS232
        Serial.begin(9600);
        // Init SPI bus
        SPI.begin();
        // Init MFRC522
        rfid.PCD_Init();
        pinMode(buzzerPin, OUTPUT);
}
```

```
void loop()
{
        noTone(buzzerPin);

        // Initialisé la boucle si aucun badge n'est présent

         if ( !rfid.PICC_IsNewCardPresent())
                return;

         // Vérifier la présence d'un nouveau badge

        if ( !rfid.PICC_ReadCardSerial())
                 return;

        // Enregistrer l'ID du badge (4 octets)

         for (byte i = 0; i < 4; i++)
          {
                  nuidPICC[i] = rfid.uid.uidByte[i];
          }

          // Affichage de l'ID

          //Serial.println("Un badge est détecté");

          //Serial.println(" L'UID du tag est:");
```

```
        for (byte i = 0; i < 4; i++)
        {
                Serial.print(nuidPICC[i]);
                //Serial.print(" ");
        }
        Serial.println();
       tone(buzzerPin, 262, 500);
       delay(500);

       // Re-Init RFID

       rfid.PICC_HaltA(); // Halt PICC
        rfid.PCD_StopCrypto1(); // Stop encryption on PCD
}
```

6.2 CODE FOR READING DATA FROM SENSORS :

```
import tkinter as tk
import serial
import time

# get and connect to arduino device
arduino_serial = serial.Serial(port='COM6', baudrate=9600, timeout=0.5)

# GUI Tkinter version
def read_data():
    # assume the data format: humidity / temperature
    data.set(arduino_serial.readline().decode('ascii').strip())
```

```
print('{}'.format(data.get()))

root.after(2000, read_data)


root = tk.Tk


data = tk.StringVar()


tk.Label(root, text='Humidity / Temperature:').grid(row=0, column=0, padx=5, pady=5)

tk.Label(root, textvariable=data, bd=2, relief='solid', width=20, fg='black', bg='white').grid(row=0,
column=1, padx=5)


read_data()

root.mainloop()
```

CHAPTER -7
RESULT & DISCUSSION

CHAPTER -7

7.1 RESULT

The RFID-based anytime machine for library management using Arduino is a project that aims to automate the management of library based on RFID technology. The system utilizes an Arduino microcontroller along with RFID reader and tags to identify books and updates the system appropriately. Based on the implementation and testing of the system, the following conclusions and results can be drawn: Efficient books updating: The RFID-based system provides an efficient and automated method for updating books. By using RFID tags to identify the required books, the system can accurately match the requirement of the user and provides them with sufficient book with the security and also this system helps the administration by providing the information about the current users as well as the attendance of students through the google excel sheets, reducing the chance of errors. This system provides the security for a student to open his/her individual account and also provides the privacy that is needed by the user.

The Insertion Data proof was done in this project as shown in the Fig. 7.1, which then resulted in the Data record of a student as shown in the Fig. 7.2.

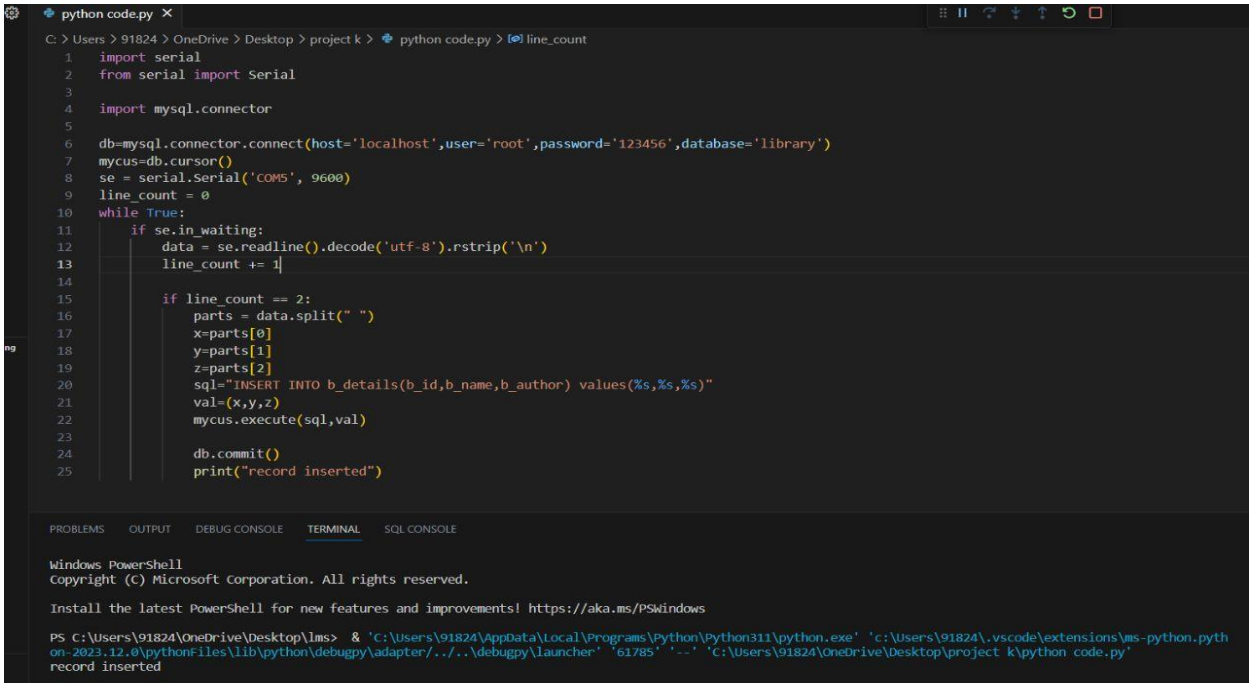

Fig. 7.1 Insertion Data proof

Fig. 7.2 Data record of a student

7.2 CONCLUSION

In conclusion, the proposed Library Management System offers a technologically advanced and comprehensive solution for efficient management of library resources. Further, based on our initial hypothesis that RFID exceeds the barcode scanner in terms of advantages, we can firmly conclude that the hypothesis has proven to be correct. It is much more efficient and faster as it can perform simultaneous scanning at once, unlike barcode which can only perform one reading. RFID also does not require a direct line of sight, thereby creating a more accurate and reliable system. Since Tags can be placed inside the books, they are less prone to damage and theft. Also, they can be used as an anti-theft system to prevent book theft. RFID also provides a better automation and user experience than barcode scanner. By integrating RFID technology, user-friendly software developed using Python and Arduino IDE, and a secure database powered by MySQL, containerized using the Docker, the system streamlines various library operations. As explained in the paper, our system demonstrates the seamless interaction between hardware components such as the RFID reader and microcontroller, and software functionalities implemented through modules like MFRC522, Tkinter, and MySQL Connector. The system enables librarians to easily add and update books using RFID scanning, retrieve book information from the database, and facilitate book transactions with accurate status tracking.

7.3 FUTURE SCOPE

Book Availability Prediction: Use machine learning algorithms to predict book demand and availability, allowing the library to better manage its inventory and make data-driven purchasing decisions. Automatic Book Sorting System: Introduce an automatic book sorting system that uses RFIDtags to sort returned books into their respective categories, making the book return process more efficient. Book Usage Analytics: Gather data on book usage, such as the number of times a book is borrowed and the average borrowing duration. These insights can help in understanding user preferences and optimizing the collection.

CHAPTER 8
REFERENCES

CHAPTER -8

8.1 REFERENCES

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