

Clevertch – Library Management System

¹Srushti Malagi, ²Pranita Jagle, ³Prasad Nandode, ⁴Ms. Deepali Yewale

^{1,2,3}Student, Electronics and Telecommunication Engineering, AISSMS Institute of Information Technology, Pune, Maharashtra, India

⁴Professor, Electronics and Telecommunication Engineering, AISSMS Institute of Information Technology, Pune, Maharashtra, India

Abstract - Clever Tech's Library Management Software offers a comprehensive solution to streamline library operations and enhance the academic experience for students, teachers, and staff. The software component includes a dedicated website where students can easily share notes, access study resources, and stay updated with college and university announcements. Furthermore, the software allows students to create their own blogs, fostering a vibrant community of knowledge sharing and engagement. This feature promotes collaboration and provides a valuable resource for individuals seeking diverse perspectives on various subjects. In parallel, our hardware component utilizes RFID technology to automate book tracking and management. By incorporating RFID readers, scanners, and Arduino Uno, our system eliminates the need for manual book handling, enhancing efficiency, accuracy, and overall resource utilization in libraries. By integrating software and hardware elements, our project revolutionizes information accessibility, community engagement, and library operations. With a focus on empowering students and supporting librarians, we aim to create an environment conducive to collaboration, knowledge sharing, and optimal resource management within educational institutions.

Keywords: Library, RFID, RFID Sensor, Notes Sharing, Software, Arduino, Academics, Study Resources.

I. INTRODUCTION

One of the prevailing challenges in libraries is the manual updating of issued books and magazines, which leads to increased human effort, sluggish processes, and the potential for errors. Moreover, the lack of organized study materials creates obstacles for subject faculties in efficiently sharing resources with students.

To address these issues, Clever Tech introduces its Library Management Software, which will be implemented in two key areas: libraries and an online portal for remote accessibility of study resources. By automating the book and magazine issuance process, this project significantly reduces human effort while improving efficiency. Additionally, the

online portal offers students the convenience of accessing resources shared by faculties across various subjects, all in one centralized location. Students can easily explore materials from different departments and years for research and study purposes, eliminating the limitations of the current scenario.

The project is divided into two distinct parts. In the hardware component, readily available RFID scanners, RFID tags, and Arduino (ATmega A328P) are utilized. These components can be easily obtained from local markets or online platforms. On the software front, a team of skilled web developers will employ the necessary technical stacks to create the online portal. Utilizing languages such as JavaScript, HTML, CSS, PHP, and WordPress, along with website hosting software, the development team ensures a seamless and user-friendly experience. No additional hardware is required for this aspect, apart from a laptop or desktop computer.

By combining efficient hardware utilization with a robust software solution, Clever Tech's Library Management Software project aims to transform library operations and enhance access to study resources. The project promises to streamline processes, empower faculties in resource sharing, and provide students with a comprehensive platform for academic growth and research.

1.1 Objectives

- 1) To increase ease of access to online resources.
- 2) Reduce manual work of librarians in maintaining books.
- 3) Reducing hassle and tedious work of teachers in sharing notes.
- 4) Storing all referral materials under one roof.

II. LITERATURE SURVEY

Fotis Lazarinis, Georgios Gkouma, "Evaluation and usage scenarios of open-source digital library and collection management tools", Emerald Group Publishing Limited, 2015. This paper evaluates OSS for digital libraries, considering technical features, content management, library operations support, search functionality, and interoperability. User evaluations show advanced features, metadata support, and

userfriendly interfaces. The study identifies language support needs and suggests practical implications for tool selection. It enhances understanding of OSS strengths, weaknesses, and usage scenarios in digital libraries. [1]

Ayodeji Iwayemi, Ile-Oluji, Sulaimon Oyeniyi Adebayo, "Development of a Robust Library Management System", IJCA, 2019. To address the limitations of manual library systems, a computerized solution has been developed that enhances library activities without replacing existing processes. Utilizing the waterfall model, it utilizes PHP, HTML, and CSS for a user-friendly front-end and MySQL for a robust back-end database. This integrated system combines library management and online access, automating resource allocation and data capture for improved efficiency. [2]

Bao-Zhong Yuan, Jie Sun, "Development and Characteristic of Digital Library as a Library Branch", ScienceDirect, 2012. This project offers new social benefits, particularly for e-learning in the digital or mobile era, by eliminating the limitations of traditional libraries such as time and space constraints. As libraries are greatly influenced by information technology, this paper presents an overview of current electronic library research, including features, strengths, weaknesses, and functions, while emphasizing the impact of technology on traditional library practices. [3]

A. Thendral Mary, S. Ramya, Mr. S. Krishna Murthy, Dr. A. Valarmathi, "Enhanced Library Management System", IJCRT, 2017. The Extended Library Management System (ELMS) is a comprehensive Windows application designed to automate day-today library activities. It offers unique features like student, librarian, and administrator login options. Developed using Eclipse IDE, ELMS efficiently handles book transactions, member, and book records, improving asset management. Librarians can issue books, track inventory, and manage modules for membership, book management, and trading, as well as publishers and returns. [4]

Heru Supriyono; Muhammad Ramadhan Fitriyan; Muamaroh, "Developing a QR Code-based Library Management System with Case Study of Private School in Surakarta City Indonesia", IEEE, 2018. To overcome the limitations of the manual library management system used by Muhammad Ramadan Fitriyan and other private schools in Surakarta City, a QR code-based computer information system was proposed. This web-based system developed using the Bootstrap framework and MySQL database, effectively records borrowing, renewal, and return processes. Tests confirmed the system's functionality and user acceptance was positive, indicating its potential to improve service to students. Implementation in other school libraries was suggested by respondents. [5]

Monica Sharma, "Unraveling the Dynamics of Digital Library Community: A Social Network Analysis Approach", IEEE, 2009. The project's efficacy in enhancing transaction efficiency has led to its widespread adoption by computerized libraries in our country. Barcode technology has emerged as a highly successful tool in library automation, offering speed, accuracy, and reliability. Despite being an older technology, its full potential in libraries is yet to be fully realized. This article explores the diverse facets of barcode technology and its implementation in libraries. [6]

Gerhard Bissels, "Implementation of an open-source library management system: Experiences with Koha 3.0 at the Royal London Homoeopathic Hospital", Emerald Group Publishing Limited, 2008. This document provides insights into the selection process and criteria used by the Complementary and Alternative Medicine Library and Information Service (CAMLIS) at the Royal London Hospital for Homeopathy in adopting the Koha 3.0 Library Management System (LMS). The decision to choose Koha 3.0 was driven by the progressive GNU (open source) license, which was deemed more flexible to meet the library's unique requirements. The study acknowledges that the implementation of the LMS is still in its early stages, and a comprehensive assessment of its effectiveness will require at least a year of usage. [7]

III. PROBLEM DEFINITION

The project involves the integration of hardware and software components to achieve the desired objectives. The hardware component utilizes RFID systems, Arduino, and related technologies to automate the process of issuing and returning books in the library. RFID systems employ radio-frequency identification technology to identify and track tags attached to objects. In the context of the project, RFID tags are placed on books. When a book needs to be issued or returned, the RFID system scans the tag using a transmitter, which triggers the system to log the respective information. Unlike traditional barcode systems, RFID does not require line-of-sight scanning, allowing for quick and efficient tagging of objects.

On the software side, the project utilizes a website developed using WordPress, PHP, JS, HTML, CSS for the frontend, and MySQL for the backend. The website serves as a platform for teachers and students to share study resources. Users can log in to their respective accounts to upload and download resources. To ensure moderation of materials, special logins are provided to responsible students or dedicated teachers who can review and approve the shared resources.

Our project's meticulous integration of hardware and software components yields a comprehensive solution for efficient library management and impactful resource sharing. By harnessing RFID technology alongside our user-friendly website, we redefine the boundaries of academic resource management, fostering an environment conducive to knowledge exchange and empowering learners and educators alike.

IV. METHODOLOGY/ APPROACH

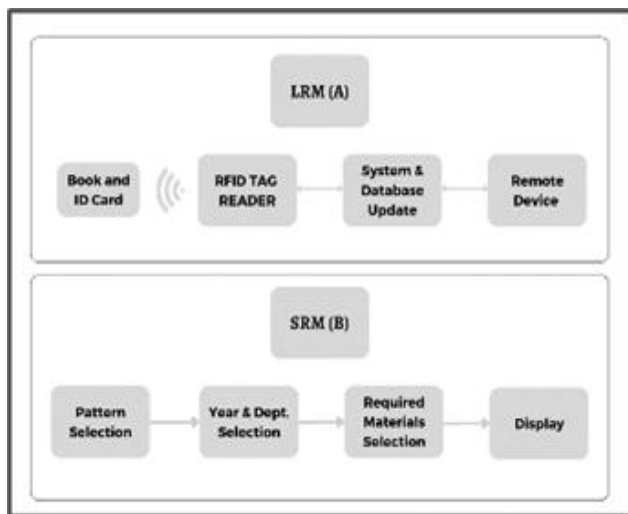


Figure 1: Block Diagram

This project is divided into 2 Parts:

Part A: Library Resource Management:

This part is a hardware part of the project and is to be deployed in libraries. RFID Cards will be pasted on the books containing information of the book, and ID Cards of students/teachers will be based on RFID. The user must scan both book RFID and ID Card simultaneously to update the issue and return information on the system. This will be done via RFID Readers. This data will then be uploaded onto the database server for remote availability checking.

Part B: Study Resource Management:

This is the software part of the project. All the Study Resources and reference material will be stored on cloud storage for easy and remote access for beneficiaries for their study purposes. Once on the website, the beneficiary should navigate to the department of which he/she wants to download resources for. Then one can select the pattern of which they want to access resources, Year, and subject. After hitting search one can see all resources available for selections and download the ones they want.

2.1 Simulation

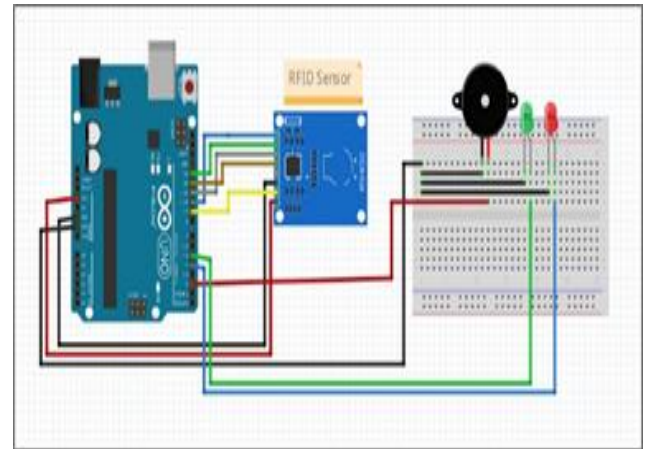


Figure 2: Simulation

The hardware part deals with the issuing and returning of the books in the library. This part deals with the automation of the process and eliminating the need for librarians being around during the process.

Process:

- i. The concerned person scans the RFID card present in the book.
- ii. The RFID sensor catches the unique code of the RFID Card and passes the information to the system.
- iii. The system confirms the information of RFID card, and the Buzzer buzzes and glows the Green LED indicating the card has been scanned successfully.
- iv. Next, we must scan the ID Card of the student/staff. This ID Card issued by the institution is printed onto an RFID Card which can help in working both ways.
- v. The following process is same as during scanning the book's RFID Card.
- vi. Now the data that has been captured from both RFID Cards are sent to the system for processing the book issuing and returning and update the same onto the database.

V. RESULTS AND DISCUSSIONS

Thus, with this hardware we have scanned the book and ID card of the issuer successfully. With the code integrated with the system, issued, and returned books can be updated easily onto the software. This has also reduced the hard and manual work of librarians. Students/teachers/ staff can issue and return the books on their own, without the compulsion of librarian to do the work.

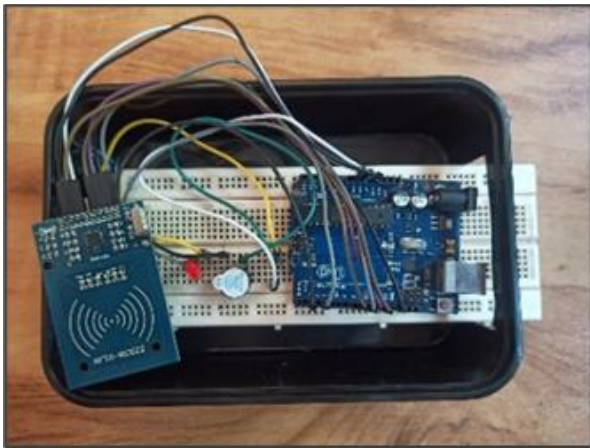


Figure 3: Final Hardware

With the Software System, Students can efficiently download resources they want, can track latest announcements listed on the website and this has also reduced the tedious work of teachers of making resources, circulars available to every student and reach them on time.

VI. CONCLUSION

In conclusion, our project has successfully developed a comprehensive solution that addresses the diverse needs of students and librarians in the academic setting. Through our software platform, students can easily access and share essential resources, stay updated with important announcements, and engage in meaningful discussions through blogging. This empowers them to enhance their learning experience and build a vibrant community.

Furthermore, our hardware component, the library resource management system, revolutionizes the way books are tracked and managed in libraries. By leveraging RFID technology, we have created an automated system that eliminates the manual tasks previously performed by librarians, leading to improved efficiency and accuracy in resource management.

By combining these software and hardware elements, we have created an integrated ecosystem that promotes effective communication, collaboration, and knowledge sharing within educational institutions. Our project not only benefits students by providing them with a centralized platform for academic resources but also supports librarians in streamlining their operations and maximizing their efficiency.

ACKNOWLEDGEMENT

We would like to express our sincere and heartfelt gratitude to Ms. Deepali Yewale, Assistant Professor of the Electronics & Telecommunication Engineering Department,

for her invaluable guidance and unwavering support throughout this project, as well as for her assistance in pursuing further studies in the field of Internet of Things. I would also like to take this opportunity to extend my thanks to Dr. M.P. Sardey, Head of the Department, along with all the staff members of the Department of Electronics & Telecommunication Engineering at AISSMS IOIT, Pune, for their cooperation and support in various ways. The inspiration provided by our honorable principal, Dr. P.B. Mane, was the driving force behind this work. Lastly, I am grateful to all those who have directly or indirectly supported our efforts.

REFERENCES

- [1] Fotis Lazarinis, Georgios Gkouma, "Evaluation and usage scenarios of open-source digital library and collection management tools", Emerald Group Publishing Limited, 2015., 2012.
- [2] Ayodeji Iwayemi, Ile-Oluji, Sulaimon Oyeniyi Adebayo, "Development of a Robust Library Management System", IJCA, 2019.M. Weiser, 21st Century Computers, Scientific Am., vol. 265, no. 3, 1991.
- [3] Bao-Zhong Yuan, Jie Sun, "Development and Characteristic of Digital Library as a Library Branch", ScienceDirect, 2012.R. Vant, "\"Implementation of Ubiquitous Sensing with RFID\"", Computer, vol. 37, no. April 2004.
- [4] A. Thendral Mary, S. Ramya, Mr. S. Krishna Murthy, Dr. A. Valarmathi, "Enhanced Library Management System", IJCRT, 2017.
- [5] Heru Supriyono; Muhammad Ramadhan Fitriyan; Muamaroh, "Developing a QR Code-based Library Management System with Case Study of Private School in Surakarta City Indonesia", IEEE, 2018.
- [6] Monica Sharma, "Unraveling the Dynamics of Digital Library Community: A Social Network Analysis Approach", IEEE, 2009.
- [7] Gerhard Bissels, "Implementation of an open-source library management system: Experiences with Koha 3.0 at the Royal London Homoeopathic Hospital", Emerald Group Publishing Limited, 2008.

Citation of this Article:

Srushti Malagi, Pranita Jagle, Prasad Nandode, Ms. Deepali Yewale, “Clevertch – Library Management System” Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 7, Issue 12, pp 144-148, December 2023. Article DOI <https://doi.org/10.47001/IRJIET/2023.712020>
