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A Smart Library Automation System based on an RFID Technology with Internet of Things

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ABSTRACT—Libraries are crucial components of human life. They are crucial for a person to learn and retain knowledge. However, there were numerous issues with the previous library system. This initiative aids in the radio wave-based identification of the numerous books with tags. The student can search the database and, if the book is available, pick it up from the library because the database displays the book's availability at the library. Utilizing RFID tags makes it easier to manage the issuance, renewal, and return processes. Using GSM, students will be informed of their book's due date. If the student doesn't return the book by the deadline, a fine based on the amount of time will be generated.

KEYWORDS—RFID, library management, book drop, smart

I. INTRODUCTION

A rapidly developing technology, Radio Frequency Identification (RFID), has a wide range of practical applications in important economic sectors like healthcare and pharmaceuticals, retail, transportation, and logistics. The current project involves designing, putting into practice, and deploying a trial RFID system for the university library. The major goal is to create an intelligent, low-cost Library Management System (LMS) using passive RFID technology operating at UHF frequencies that increases workplace productivity while lowering labour and operating costs. The ongoing project's broad goals are as follows:

a) The automation of labour-intensive and time-consuming stock-taking processes; b) The replacement of the outdated, paper-based procedures for checking books in and out of the library; c) An increase in workplace productivity as a result of the elimination of these procedures; d) A decrease in the operating costs of the library as a result of a more productive and highly efficient working environment; and e) A decrease in thefts and the number of misplaced items.

The research team has taken on the task of designing and constructing the following in order to fulfil the project's aforementioned general objectives: a) A smart RFID bookshelf that is interfaced with computer technology via a portable, user-friendly GUI; b) A check-out counter where library patrons can borrow books using RFID-enabled system that is fully integrated with the library database system; c) A portal RFID-enabled system that is activated when a book that hasn't been properly checked out is going to leave the library door. d) A book-return counter or drop box where a library customer can return books without the assistance of a librarian.

The user should approach the lending counter and introduce himself to the employee. The operator adds the books that will be checked out to the system, marking their status as checked out. As a result, no warning will sound when the user leaves the library. Similar to this, since the books the user has previously borrowed are marked as being checked out, no alarm will sound when the user wants to return them. The user should approach the lending counter and introduce himself to the employee. The operator inputs the returned books into the system, designating their status as returned (i.e. unborrowed). As a result, the alarm will sound whenever someone holding these books leaves the library. The users can remotely monitor the books' availability.

II. RELATED WORK

Nivedita Malipatil, V. Roopashree, R. H. Sanjana Gowda, M. R. Shobha, H. C. Sateesh Kumar.—Libraries are crucial components of human life. They are crucial for a person to learn and retain knowledge. However, there were

numerous issues with the previous library system. This initiative aids in the audio wave-based identification of the numerous books with tags. The student can search the database and, if the book is available, pick it up from the library because the database displays the book's availability at the library.

Chetan J. Jadhav, Shivanis. Jadhav, Vijaym. Sancheti, Prof. Shailesh. Hajare This paper discusses the RFID-based Smart Library Management System (SLMS), which enables quick transaction flow and makes it simple to manage tasks like lending and returning books from the library without a lot of manual labour.

Dr. Annaraman, P. Thamarai, Dr. T. V. U. Kiran Kumar - This study discusses the potential use of Radio Frequency Identification (RFID), a new generation of auto identification and data gathering technology, in a future Smart Library Management System.

Anastasis C. Polycarpou, Theodoros Samaras, and John N. Sahalos - In this paper, the creation of an intelligent LMS for the university library was the subject of a pilot project. To provide all of the key capabilities needed by library personnel and users, a GUI was designed.

Anusree Prajeeshan, Abir Roy, Alok Walunj, Mahesh Kamthe - This paper suggests RFID-based smart library management system that gets around all of these problems.

I. Markakis, T. Samaras, C. Polycarpou, J. N. Sahalos - The radiation properties of the smart cabinet, assuming specific types of shelf antennas, will be the primary emphasis of this research.

Harish Gurrapu, Kaustubh Vayal, Vivek Singh, Prof. Rajeshri Anesh - In addition, this method enables users to read books from their phones wherever they are. The cloud-based data is used by the system.

Sateesh Kumar H C - Libraries are very important aspects for humans. They are essential in acquiring and retaining the knowledge of a person. But the earlier library system has caused many problems. This project 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.

III. PROPOSED SYSTEM

The RFID system is an essential component of the smart library management system. The incorporation of passive RFID technology into a library management system was proposed in this paper. This connection makes the tasks of both library users and employees simple, smart, convenient, automated, and practical. The proposed system makes it possible for library workers to handle sorting, lending, returning, labelling, and eyeing books in a simple and convenient manner. Furthermore, utilising the suggested system, library customers can simply and remotely find, borrow, locate, and renew the borrowing time of books.

Furthermore, the suggested door lock module assures the security of the library and efficiently prevents book thefts.

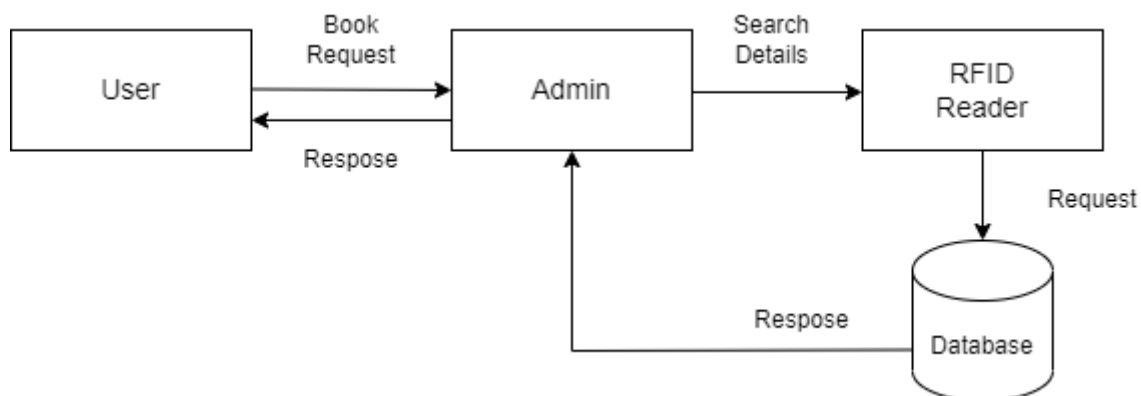


Figure 1. System Architecture

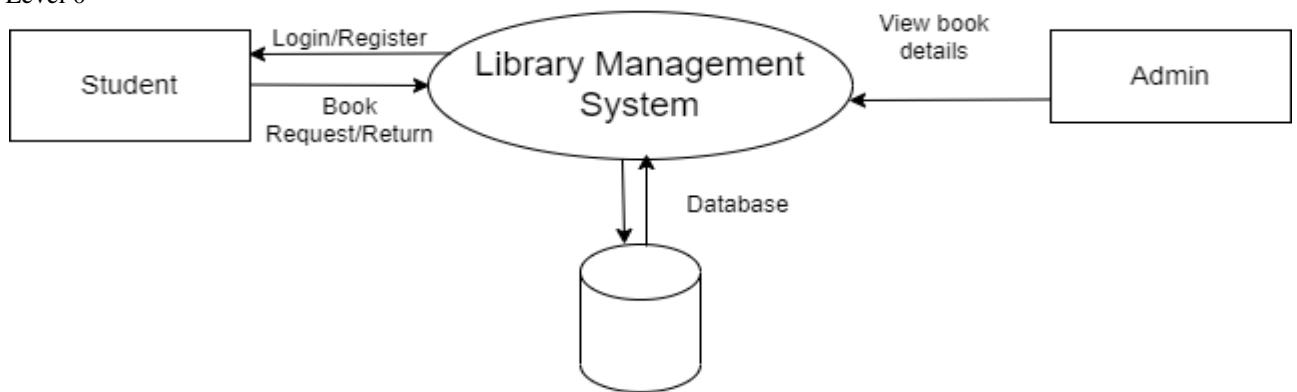


Advantages:

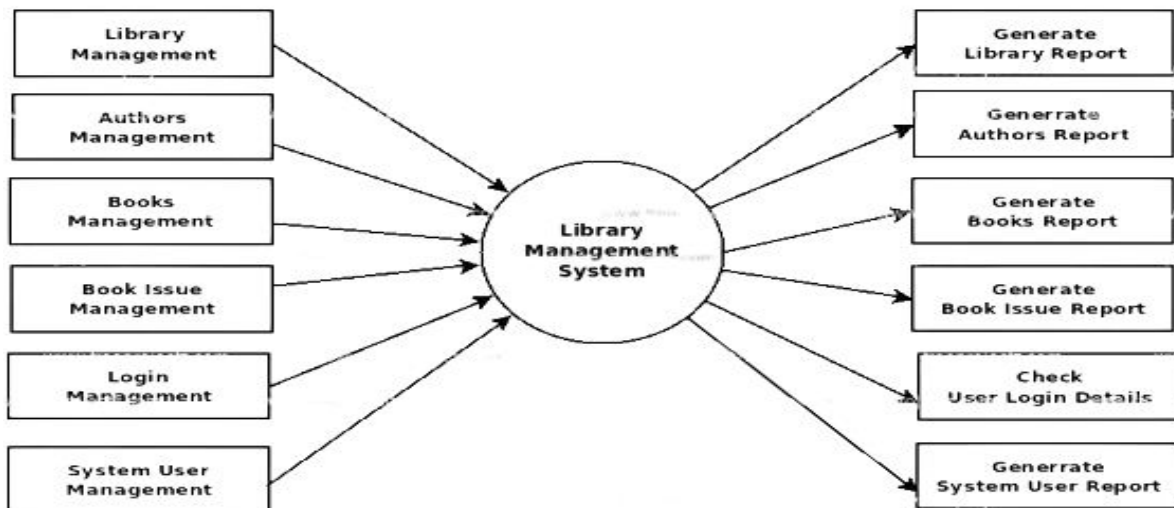
- The ability of RFID systems to scan books on shelves without tipping them over or taking them off is a special benefit.
- Reduce the number of lines at the front desk.
- Reduce repetitive tasks.
- Increase customer interaction; 4. Extend internal security.
- Reduce the cost of manipulating and managing collections.
- Provide collections, checking, and accepting automation.
- Improve the effectiveness of inventory and arrangement.

Data Flow Diagram

Level 0

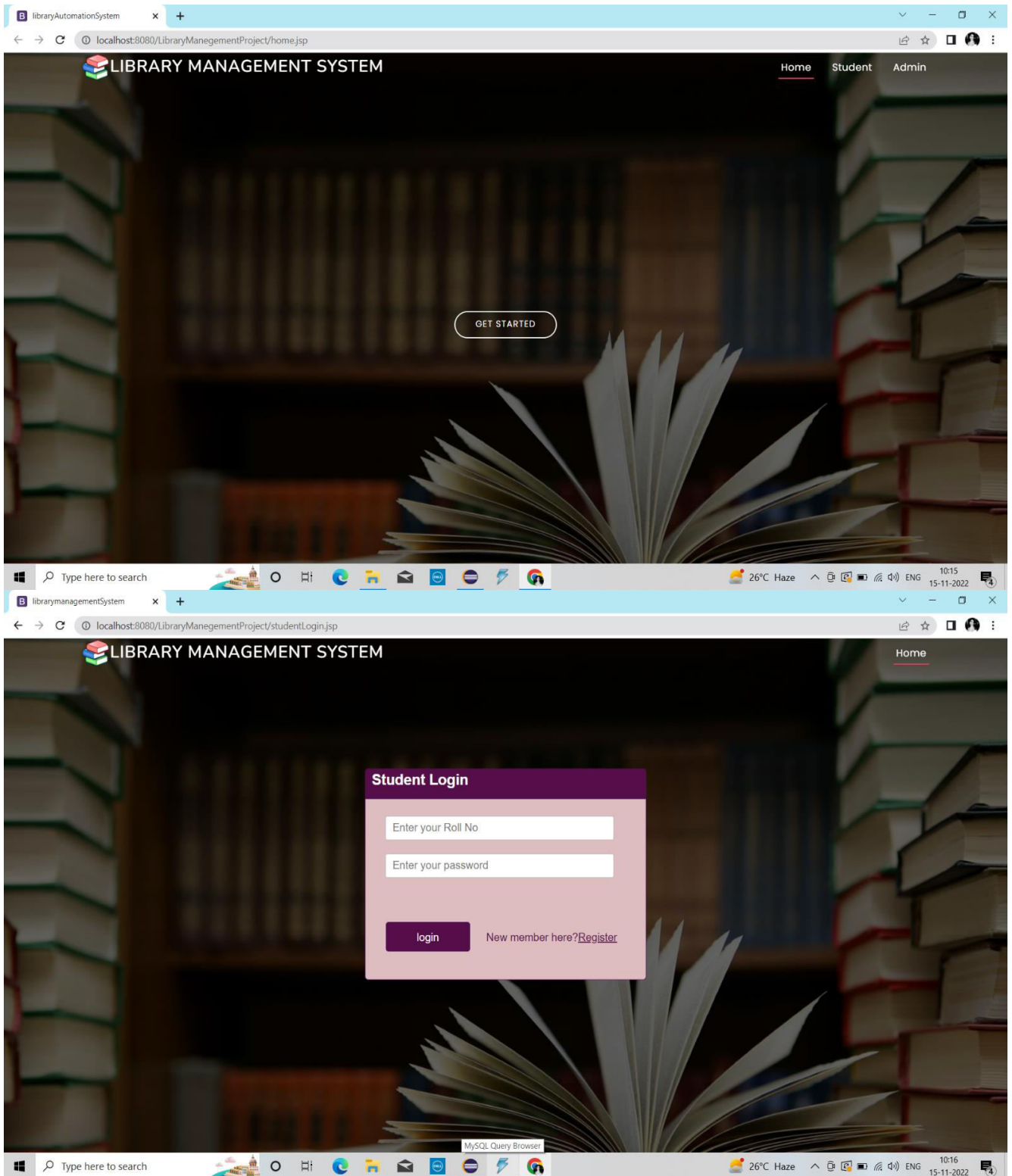


Level 1





IV. RESULT

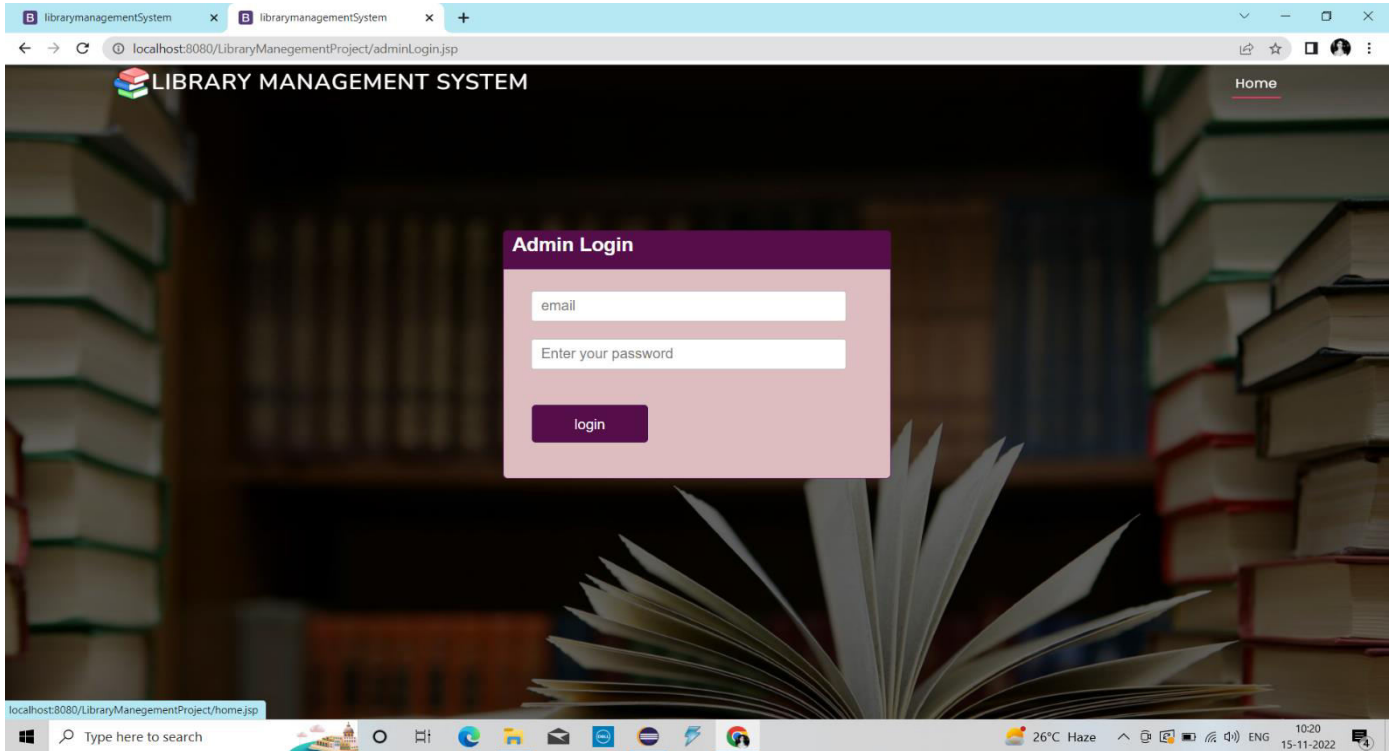




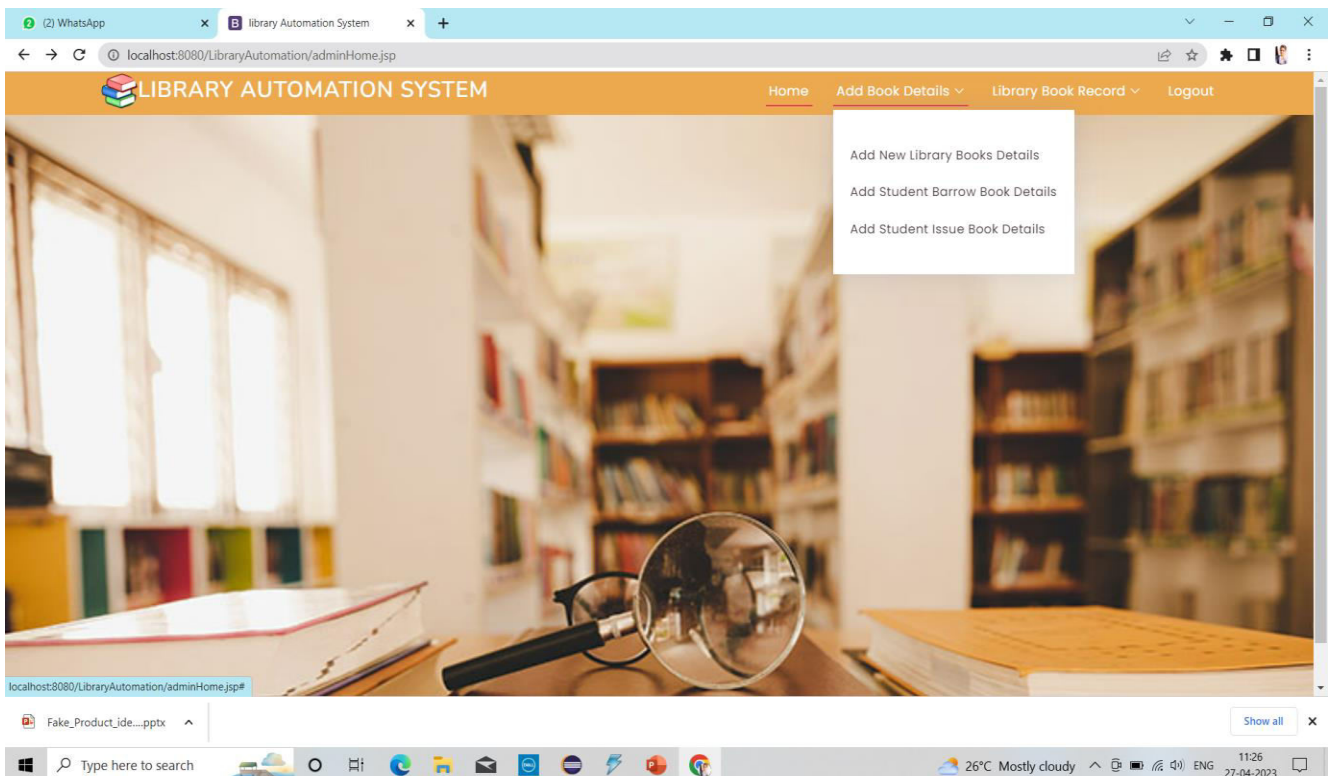
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GUI Implementation



Admin Login

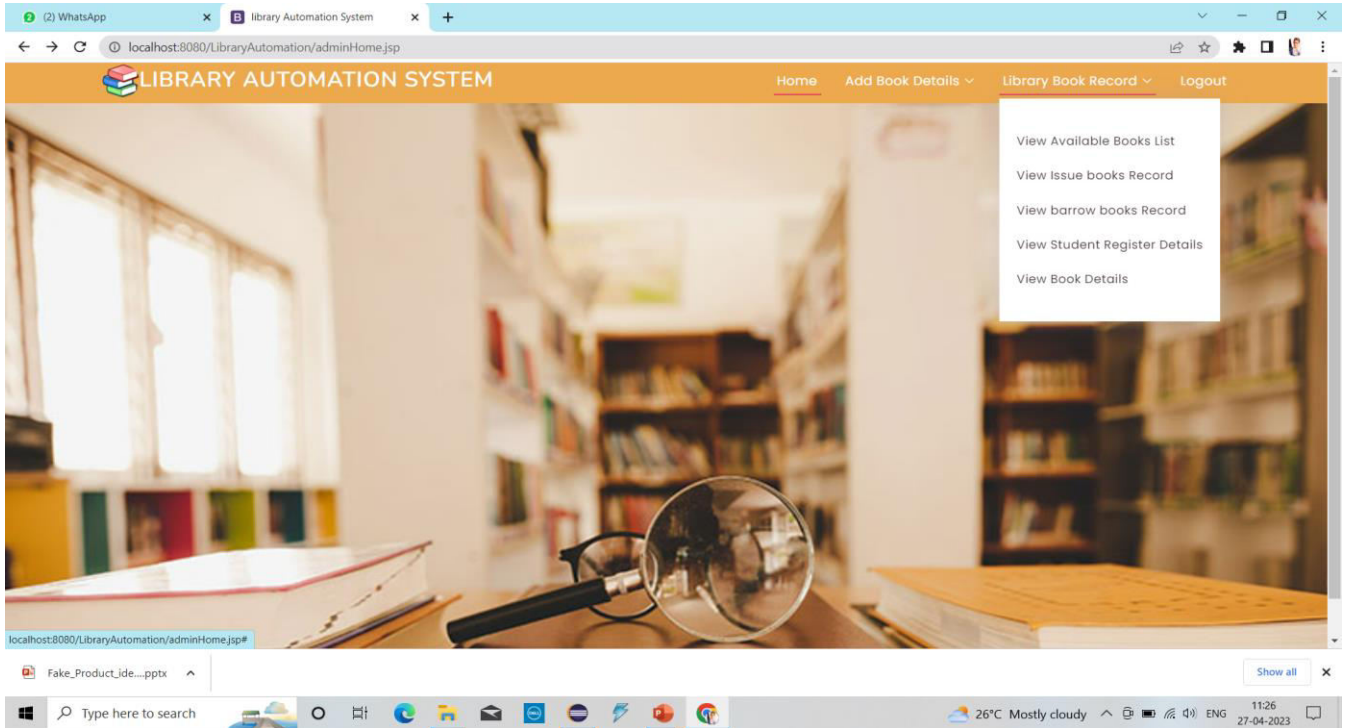




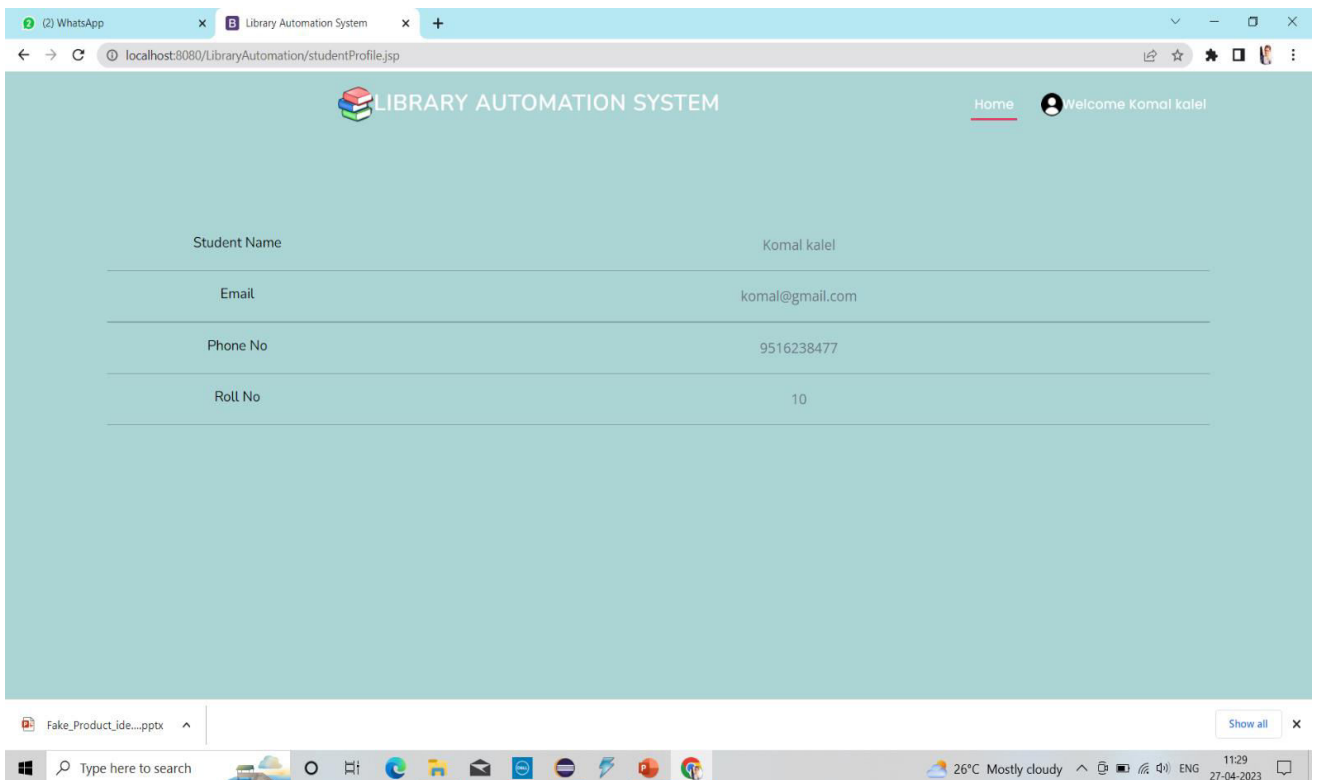
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After Admin Login



After Admin Login

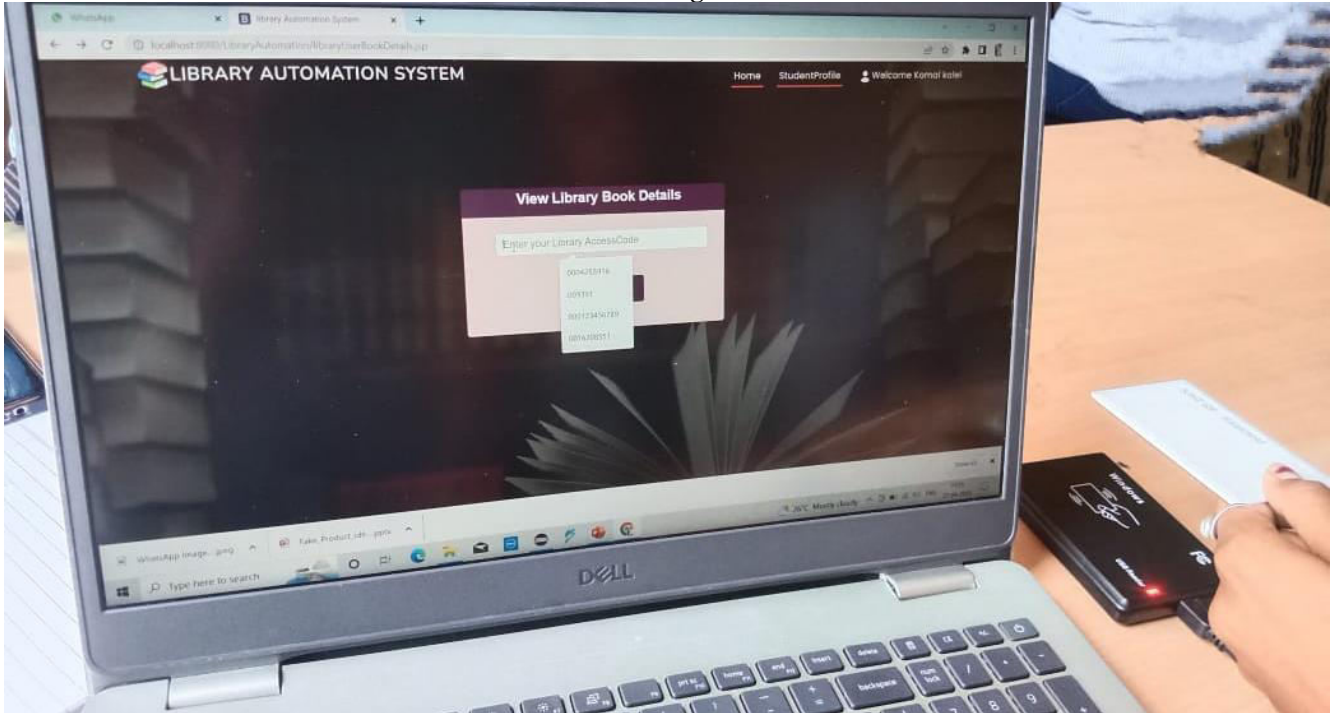




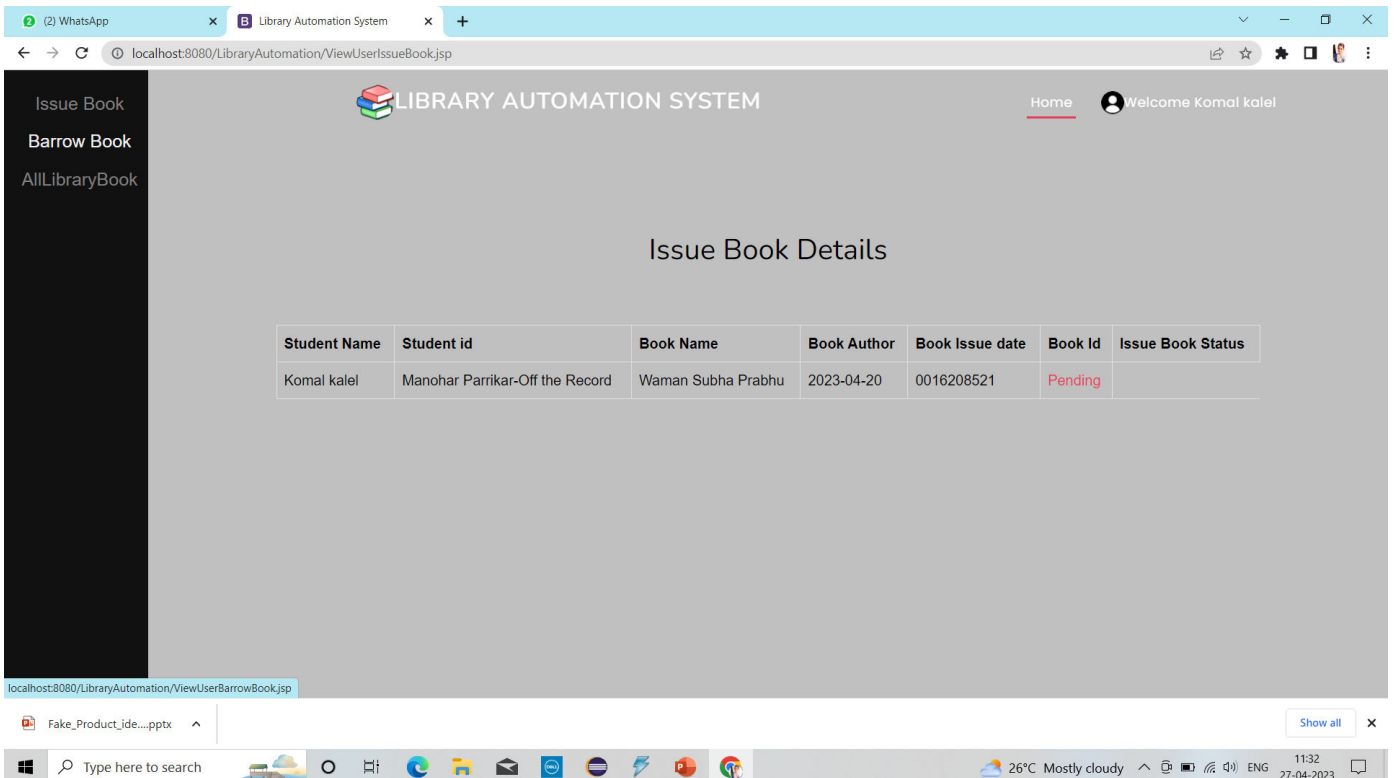
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Student Login



RFID Scanner





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Issue Book Details

book Number	Book Name	Book Author	Book Status
0016208521	Manohar Parrikar-Off the Record	Waman Subha Prabhu	Available
0016218906	A Better India: A Better World	Amrita Pritam	Available
0016208551	Operating System	Vijay Patil	Available
0016208657	A Revenue Stamp	E.M. Foster	Available
0016208542	A Passage to India	Narayana Murthy	NotAvailable

Library Book Details

View All Library Book Data of Student



VI. CONCLUSION

The smart library management system includes the RFID system as a key component. This study suggested integrating a library management system with passive RFID technology. The task for both library patrons and employees is made simple, clever, convenient, automated, and useful by this integration. The suggested approach makes it possible for the library personnel to manage the sorting, lending, returning, labelling, and examining of books in such a simple and practical way. Additionally, utilising the suggested system, library patrons may simply locate, borrow, localise, and extend the time that books are checked out. The suggested door lock module also efficiently deters book theft while ensuring the security of the library. Open and modular in design, the SLMS can be expanded for new features and updating requirements.

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