IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 9, September 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.625

© 2024 IJIRCCE | Volume 12, Issue 9, September 2024| DOI: 10.15680/IJIRCCE.2024.1209015

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

CAMPUS LIB-CONNECT VIA ROBOT

Chandan C P, Chandan Nagaraj Guttal

UG Students, Department of C.S.E, SSIT, Sri Siddhartha Academy of Higher Education, Tumkur, Karnataka, India

Assistant Professor, Department of C.S.E, SSIT, Sri Siddharth Academy of Higher Education, Tumkur, Karnataka, India

ABSTRACT: Introducing automation in library operations addresses the challenges associated with manual book retrieval and maintenance. By incorporating Radio Frequency Identification (RFID) equipment and Zigbee technology, along with advanced software features accessible via a website or personal computer, libraries can streamline the borrowing and returning processes. Users can conveniently select the desired book through the library's website, initiating a request borrowing or returning. Meanwhile, administrators gain comprehensive control over library activities, managing tasks such as book availability, user requests, and inventory updates through the software interface. Once a user selects a book for borrowing, the system triggers the robot to locate and retrieve the requested item from the shelves autonomously. The robot then delivers the book to the designated borrowing table, optimizing the efficiency of the borrowing process. Similarly, when a book is returned, the robot receives the item from the user, accurately re-shelves it, and updates the inventory status accordingly. This integration of automation not only enhances user experience by reducing waiting times and improving accessibility but also empowers library staff to focus on more strategic tasks, ultimately fostering a more efficient and organized library environment.

The proposed system encompasses a user-friendly web interface with login and registration functionalities, providing a seamless experience for users. The main page serves as a comprehensive repository of project details, while an intuitive interface facilitates the initiation of real-time monitoring. Alerts are generated promptly upon detecting helmet and mask-wearing individuals or the presence of more than one person, ensuring swift responses to potential security threats.

KEYWORDS: Applied the knowledge of IOT, Sensors and Software Engineering

I. INTRODUCTION

Traditional library management involves manual processes, becoming cumbersome in large libraries. Solutions like line-following robots and expensive control boards have limitations. An automated shelf scanning robot with RFID technology scans shelves but doesn't handle book retrieval. To address this, a proposed system introduces automation with a user module and web interface, coupled with a robotic module featuring a versatile robotic arm. This aims to significantly reduce the workload on librarians while maintaining cost-effectiveness. RFID technology emerges as a pivotal solution for efficient library management, especially in academic settings. RFID tags, categorized as active, semi-passive, and passive, provide a means to store and retrieve data efficiently. While active and semi-passive tags are suitable for valuable asset tracking, passive RFID tags find applications in library management systems. Existing manual and barcode-based inventory systems pose challenges such as human errors and line-of-sight limitations. The proposed solution leverages RFID technology and IoT to seamlessly automate library systems, eliminating the need for human intervention, enhancing efficiency, reducing time consumption, and providing added security

II. RELATED WORK

A comprehensive review of the literature on text-to-SQL parsing is discussed in [2], including experimental datasets ,a taxonomy that classifies representative text-to-SQL approaches, challenges faced by text-to-SQL parsing, and potential future directions in this field. The paper is organized into several sections, including an introduction, a formal definition of text-to-SQL parsing, presentation of datasets and scenarios, and discussions of pre-training, encoding, and decoding techniques. The study demonstrates that RFID-based strategies enable autonomous mapping with comparable inventory

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

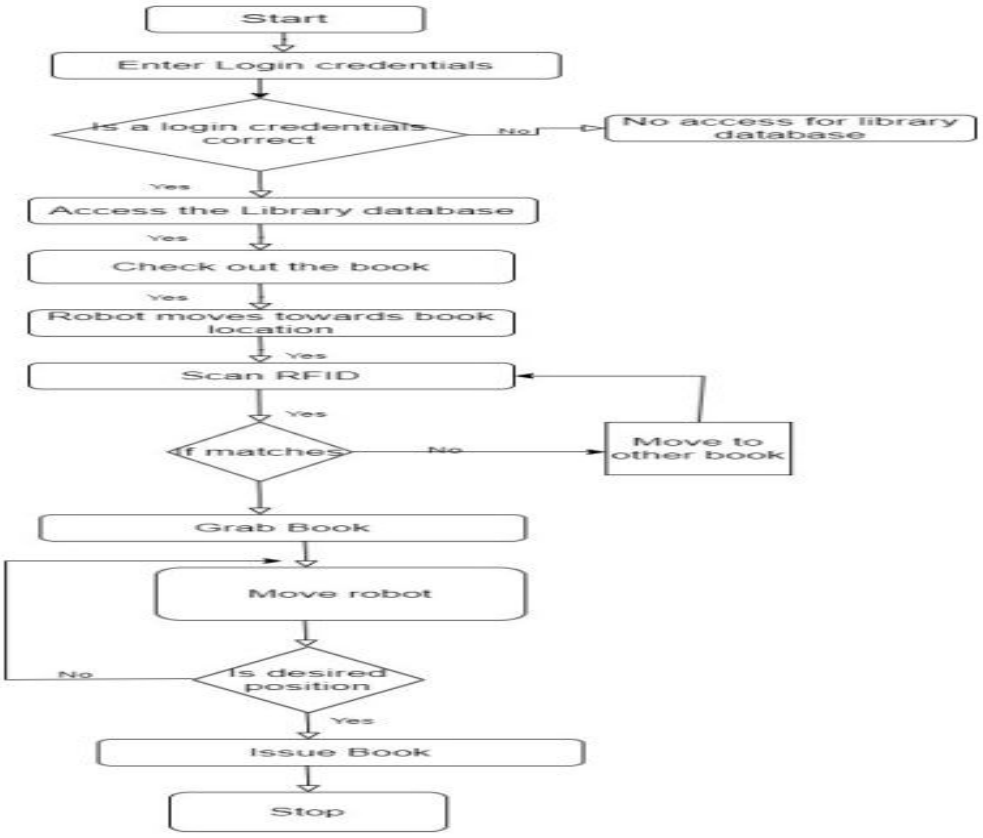
(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

accuracy to non-autonomous methods [3]. This highlights the potential of RFID technology in enhancing the autonomy and scalability of inventory robots, addressing challenges posed by dynamic commercial environments.

III. PROPOSRD WORK

Continuous testing is conducted throughout the development process to ensure the software functions as intended and meets user requirements. Regular sprint review meetings provide opportunities for stakeholders to review completed work and provide feedback for refinement. Deployment involves careful preparation to ensure seamless integration with existing library infrastructure, followed by comprehensive training and support for library staff. Maintenance and upgrades are ongoing, with the team monitoring the system post-deployment, addressing any issues that arise, and implementing regular updates and enhancements based on user feedback and evolving needs. Through this Agile Scrum methodology, the development team can efficiently collaborate, adapt to changing requirements, and deliver a high-quality software system that revolutionizes library operations with automation and efficiency. Additionally, the proposed system incorporates a multi-person detection capability, providing alerts when more than one person is present within the Machine. This functionality enhances security by signaling potential security breaches, unauthorized access, or activities that may compromise the safety of users.

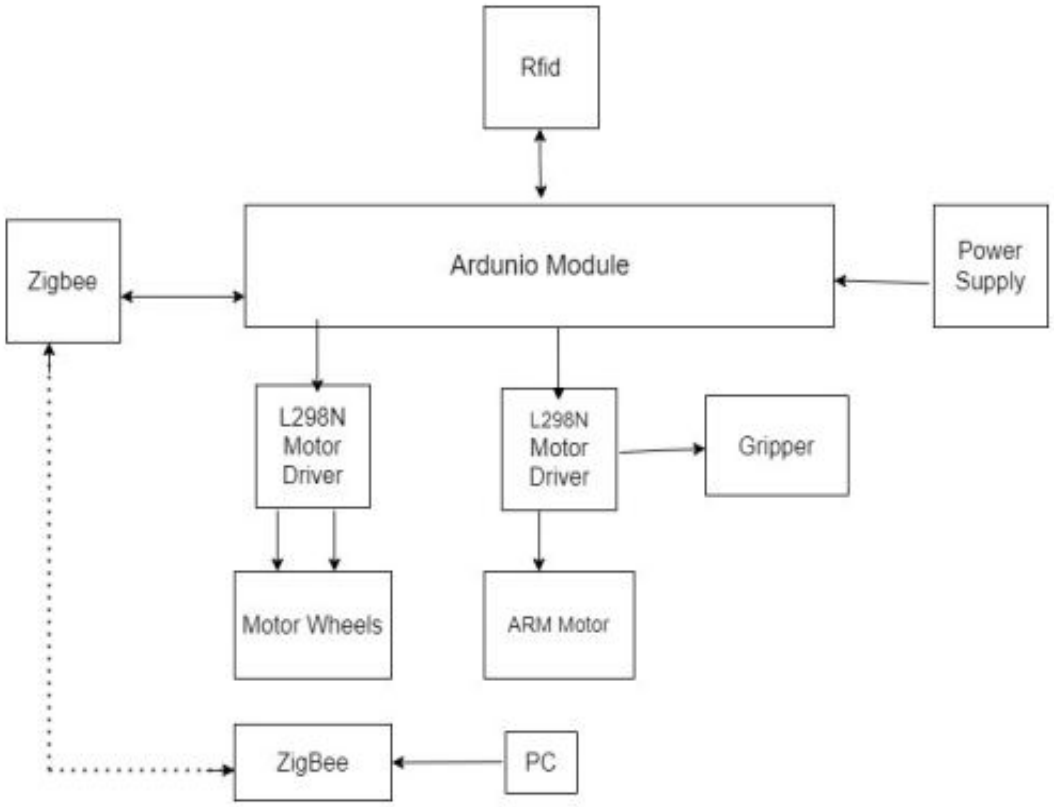
MODEL OF PROPOSED WORK BLOCK DIAGRAM



www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



• Backend Development with Flask: Utilizing Flask, a lightweight Python web framework, for backend development. Set up routes to handle user authentication, book requests, and database interactions. Use Flask-SQL Alchemy to interact with the SQ Lite database, defining models for library data and user information. Implement CRUD operations (Create, Read, Update, Delete) for managing library resources and user requests.

• Frontend Development with HTML and CSS: Develop the frontend of the library website and administrator dashboard using HTML for structure and CSS for styling. Utilize Flask's template engine to render dynamic content and integrate with backend functionalities. Design intuitive user interfaces for users to search for books, initiate borrowing or returning requests, and download digital copies.

• Database Setup with SQLite: Leverage SQ Lite, which is integrated into Flask's structure, as the database management system. Define database schemas to store library data, user information, book inventory, and transaction history. Implement database migrations using Flask-Migrate to manage changes to the database schema over time.

• Embedded C Code for Robotic Module: Writing firmware in Embedded C for the Arduino Uno microcontroller to control the robotic module. Implement logic to control locomotion, gripper mechanism, and communication with the backend system. Utilize OS path functionalities for robot navigation within the library environment.

• Zigbee Integration: Integrate Zigbee modules into the robotic module for wireless communication with the backend system. Develop software components to handle data communication between the robotic module and the Flask backend. Implement error handling and synchronization mechanisms to ensure reliable communication between hardware and software components.

www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

IV. PSEUDO CO

```
@app.route('/')
def index():
return render_template('index.html')

@app.route('/userlog', methods=['GET', 'POST'])
def userlog():
if request.method == 'POST':

connection = sqlite3.connect('user_data.db')
cursor = connection.cursor()

email = request.form['email']
password = request.form['password']
query = "SELECT name, password FROM user WHERE email = '"+email+"' AND
password= '"+password+"'" cursor.execute(query)

result = cursor.fetchall()

if len(result) == 0:
return render_template('index.html', msg =' Sorry, IncorrectCredentialsProvided, TryAgain')
else :
f = open('session.txt',' w')
f.write(email)
f.close()
```

```
returnrender_template('userlog.html')

return render_template('index.html')

#function for updating the book
@app.route('/update_book', methods = ['GET',' POST'])
def update_book() :
if request.method ==' POST' :

connection = sqlite3.connect('user_data.db')
cursor = connection.cursor()

book = request.form['book']
row = request.form['row']
column = request.form['column']
if book == 'vlsi':
row = 1
column = 1
if book == 'network':
row = 1
column = 2
if book == 'dsp':
row = 1
column = 2
```

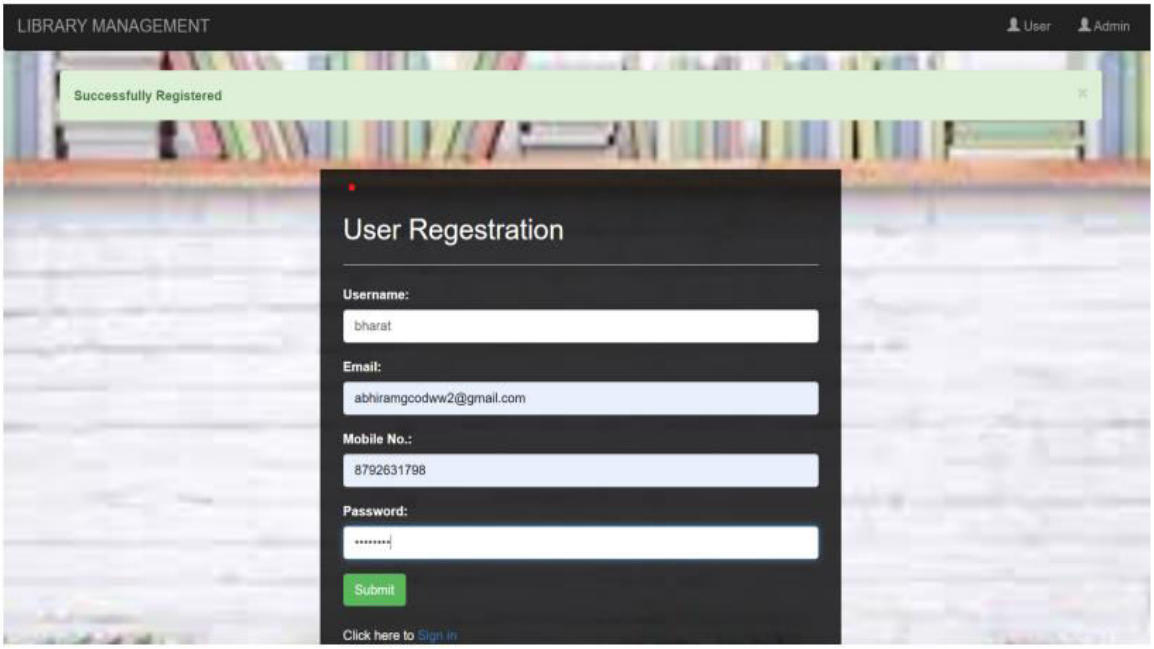
© 2024 IJIRCCE | Volume 12, Issue 9, September 2024| DOI: 10.15680/IJIRCCE.2024.1209015

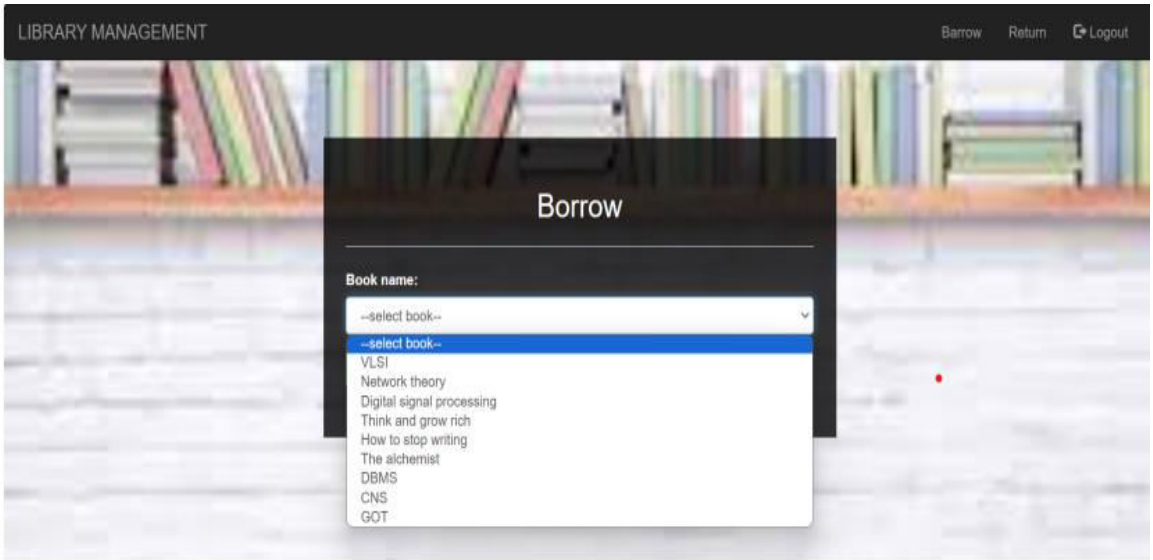
www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

V. RESULT SNAPSHOT

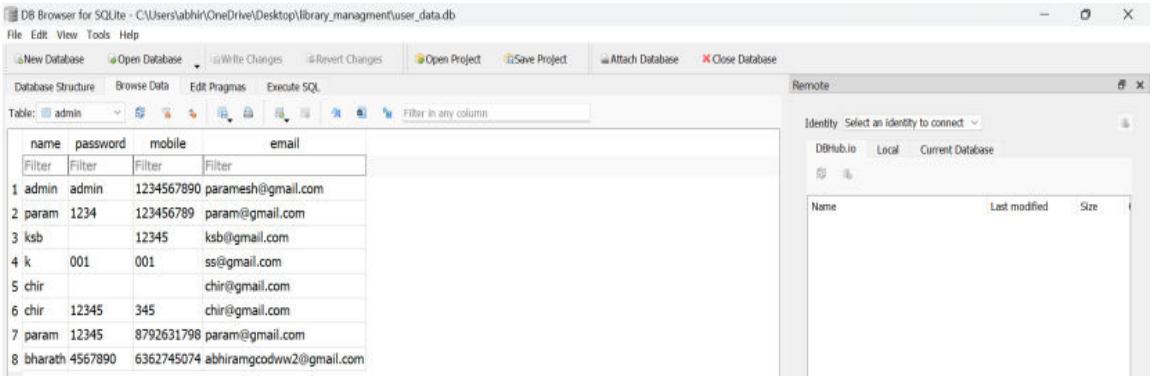




www.ijircce.com | e-ISSN: 2320-9801, p-ISSN: 2320-9798| Impact Factor: 8.625| ESTD Year: 2013|

International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



VI. CONCLUSION AND FUTURE WORK

Automation to library tasks is a big change that helps with problems in finding and taking care of books by hand. Libraries can make their services better and easier to use by using Zigbee technology, RFID equipment, and new software features. . The website of the library allows users to easily choose and request books, while administrators have complete control over a range of activities, including managing inventory and user requests. This more effective method not only cuts down on wait times but also frees up library employees to work on other strategic projects, which creates a more productive and well-organized library atmosphere. Furthermore, the user interface can be improved using AI-based natural language processing (NLP) techniques, which allow for more natural interactions through voice commands and conversational interfaces. Furthermore, AI can be extremely helpful in automating difficult processes like metadata tagging and semantic indexing, which will make cataloging and retrieving library items more effective. All things considered, the incorporation of AI technology has the potential to completely change the way libraries operate. It will allow them to provide highly customized and intelligent services while maximizing resource use and operational effectiveness in a world that is becoming more and more digitally focused.

REFERENCES

[1] George Katsogiannis-Meimarakis, Georgia Koutrika, “A survey on deep learning approaches for text-to-SQL”, 2023.
[2] Chang-You Tai, Ziru Chen, Tianshu Zhang, Xiang Deng, Huan Sun, “Exploring Chain-of-Thought Style Prompting for Text-to-SQL”, Conference on Empirical Methods in Natural Language Processing-2023.
[3] S.L´opez-Soriano; Rafael Pous, “Inventory Robots: Performance Evaluation of an RFID-Based Navigation Strategy”,Sensors Journal (Volume: 23, Issue: 14)IEEE,2023.
[4] Adarsh Patnaik; Vibhakar Mohta; Shivam Kumar Panda, “Design of an All-Purpose Terrace Farming Robot”, 18th IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications (MESA) IEEE/ASME,2022.
[5] Jingjing Li ,“The Innovation of Library Service by Artificial Intelligence Robot ”, Intelligence, Robotics and Control 3rd International Conference on Artificial (AIRCO),2022.
[6] Heri Nur Alim; NiamTamami; Ali Husein Alasiry , “Automated Library System Mobile Robot using A-Star Algorithms ”, IEEE , 2022.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details