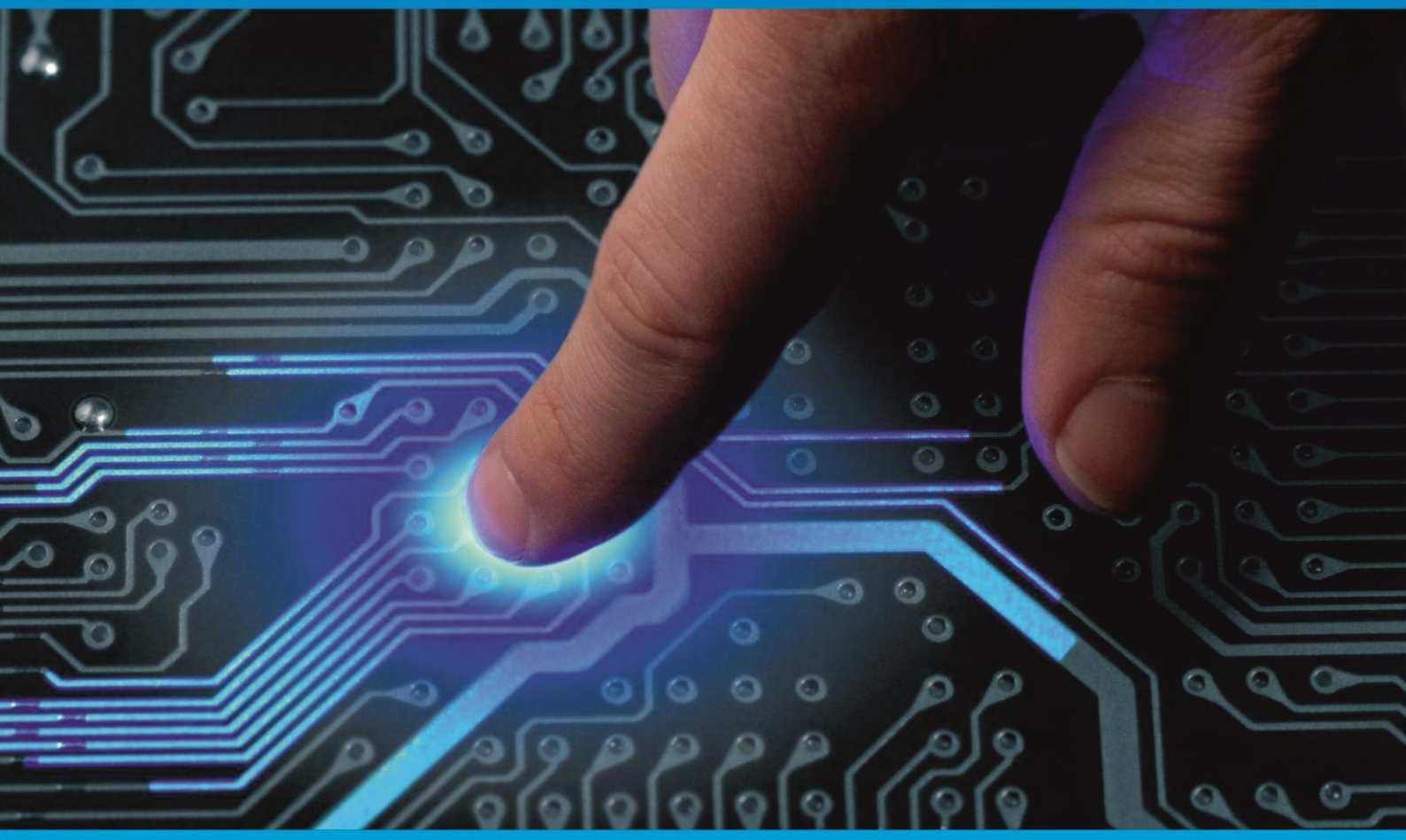
IJIRCCE

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



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 7, July 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007048 |

Smart Robotic Library Using IoT

Ganavi A , Roopa N K , Shivani S K, Sowmya A M, Prof Channappa Gowda D V

UG Student, Dept. of I.S.E., The Oxford college of Engineering, Bangalore Karnataka, India

UG Student, Dept. of I.S.E., The Oxford college of Engineering, Bangalore Karnataka, India

UG Student, Dept. of I.S.E., The Oxford college of Engineering, Bangalore Karnataka, India

UG Student, Dept. of I.S.E., The Oxford college of Engineering, Bangalore Karnataka, India

Dept. of I.S.E., The Oxford college of Engineering, Bangalore Karnataka, India

ABSTRACT: Can the smart city provide a new perspective for public and academic libraries? How does the smart city impact the libraries as cultural and scientific assets? And how can libraries contribute to the development of the smart city? An overview of recent library models, like the learning center or the green library, reveals affinities with the concept of the smart city, especially regarding the central role of information and the integration of technology, people, and institutions. From this observation, the paper develops the outline of a new concept of the smart library, which can be described in four dimensions, i.e., smart services, smart people, smart place, and smart governance. However, the smart library concept does not constitute a unique model or project, but a process, a way of how to get things done, that is less linear, less structured, and more creative and innovative. Also, smartness may not be a solution for all library problems.

KEYWORDS:smart library; smart city; library marketing; public library; academic library

I. INTRODUCTION

Robotics is a cutting-edge technology in today's world. When we think about robotics, the first thing that comes into our mind is automation. Robots are known to perform various functions automatically without much human intervention, except for initial programming and instruction set being fed into them. Inventory tracking is a dreary but important process for inventory management. In particular, a library easily contains hundreds of thousands of books that are frequently borrowed and returned back to the shelves. In order to make it effortless to locate a particular book, books are placed in specific locations and arranged in a sequence based on their call numbers. Library staffs have to ensure that the books are placed in order, an extremely tedious and time-consuming process. First and foremost, they need to manually search for books that are misplaced, then pick them up and insert it in the accurate location. This might be a facile task in case the library is small. Also, in order to search for the books, humans take a lot of time as majority of the times the books go unnoticed by the human eye. To automate this process of book finding, picking and issuing we suggest a robot which will be able to find out the book with the required tag and then bring it to the desk.

II.RELATED WORK

The paper here considers links to correspond to human arm as upper arm and forearm. Wrist joint is last part of arm. All the problems and difficulties for the library management process have been acutely studied here.Here, they are building up a framework utilizing sensors, as indicated by the sensor information the development of the robot is controlled. By utilizing mechanical arm this framework picks the book from source area and drops it at the destination. Furthermore, LabVIEW programming is used to control and monitor the system.Ultrasonic sensor is used for obstacle avoidance.This paper demonstrates the application of Line Following Robot for library management system. A linefollowing robot is designed by making use of sensor operated motors which keep track of the linear path predetermined for library book arrangements. The robot carries a barcode reader that collects the barcode data from the books arranged in a vertical manner and compares the decoded barcode data with the search input. If the robot successfully reaches the book which is to be found out, then it gives the location of the book to the librarian. If the robot faces any obstacle while searching, it halts and sends an alarm.efficient robot is built by utilizing the National Instruments myRIO along with graphical programming called LabVIEW. Efficient Object Identification with Passive RFID Tags: This paper here gives information about theworking of RFID. Radiofrequency identification systems with passive tags are powerful tools for object identification.However, if multiple tags are to be identified simultaneously, messages from the tags can collide and cancel each other out. Therefore, multiple read cycles have to be performed in

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007048 |

order to achieve a high recognition rate. For a typical stochastic anti-collision scheme, we show how to determine the optimal number of read cycles to perform under a given assurance level determining the acceptable rate of missed tags.This yields an efficient procedure for object identification. We also present results on the performance of an implementation.

III.PROPOSED ALGORITHM

Design Consideration

- In a library books are arranged in shelf based on their context.
- Robotic based "Smart Library System" is simplifying the user's task of searching and collecting books.
- A web application is developed which helps the user to search the books.
- Each book in the library is fitted with a RFID tag.
- Server verifies whether the student is eligible to take the book or not.
- Server sends the task to the robot to collect the books.
- Robot moves to the required shelf and starts scanning the RFID tags
- When the tag is matched, it picks the book and moves back to the original position.
- The robot places the book on the rotating table in the assigned slot.
- Student while collecting the books enter the OTP to verify.
- Server matches the OTP and send instruction to the controller connected with the rotating table.
- The table rotates and student can collect the book.

Advantages:

- The main focus of this work is to efficiently aid the user and the librarian.
- It provides the user an easier access to the library catalogue and the issue and return of books through the web application.
- No matter whatever location and position in which the book is placed, the proposed robot can search and collect the books on behalf of the students.

Round Robin Scheduling

- Round Robin is the preemptive process scheduling algorithm.
- Each process is provided a fix time to execute, it is called a **quantum**.
- Once a process is executed for a given time period, it is preempted and other process executes for a given time period.
- Context switching is used to save states of preempted process.

IV.PSEUDO CODE

Step1: Admin login
Step2: Admin add the book details
Step3: Admin assign the RFID tag to each book and save the details in the database
Step4: Admin add the student's details
Step5: Student can login and search book
Step6: Students send request for a book
Step7: Server checks the book availability
Step8: Server send the request to the robot to collect the book
Step9: Robot moves towards the book shelf and scans the RFID tag
Step10: If RFID tag matches, robot picks the book and moves towards the rotating table
Step11: Student login and send collect request
Step12: Server checks the slot number and send slot number to the controller of the rotating table

V.SIMULATION RESULTS

THE THREE FUNCTIONS CARRIED OUT BY THE SMART VOICE CONTROLLED ROBOT PERSONAL ASSISTANT VEHICLE ARE DISCUSSED HERE.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007048 |

1. *Robot Vehicle Movement Control*
   Predefined spoken instructions are used to control the robot vehicle's movement, as shown in Table II. The user issues vocal commands through the webcam's built-in microphone. The built Python application transforms the voice commands into text letter outputs such as "F", "B", "L", "R", and "S", which are then sent to the Raspberry Pi to drive the motors connected to the robot vehicle's wheels as shown in Table II.

TABLE I. VARIOUS COMMANDS USED FOR CONTROLLING THE ROBOT VEHICLE

Voicecommandinput	Pythonprogramoutput	RobotVehicleAction
Forward	F	Forwardmovement
Backward	B	Backwardmovement
Right	R	Rightmovement
Left	L	Leftmovement
Stop	S	Stop

2. Book Details: Admin of the library add the books details. While adding the book details admin provide book id, book name, author, shelf number, RFID tag number attached with the book. These details are saved in the mysql database. Admin even add the student's details.
   Book Request: Student can login through the web portal. Student can search for books based on the categories. Student canchoose the books that he/she wish to borrow. After selecting the books student send the request. Server checks theeligibility and send the request to the robot to collect the books. Server sends the rfid tag number of the books andshelf number.
   Collect Books When the student goes to the library to collect the books, login to the portal and send request to collect the books.Server verifies the student by sending an OTP. If verifies, server send the request to the controller of the conveyorbelt to rotate. The conveyor belt rotates so that the assigned slot will be at collection desk.

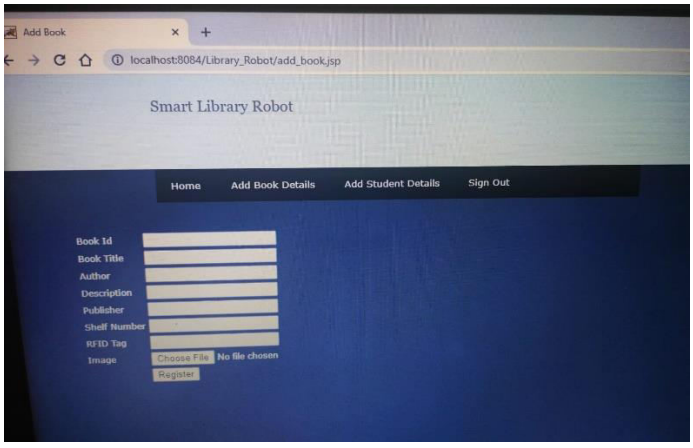


Fig1: Book details

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 7, July 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1007048 |

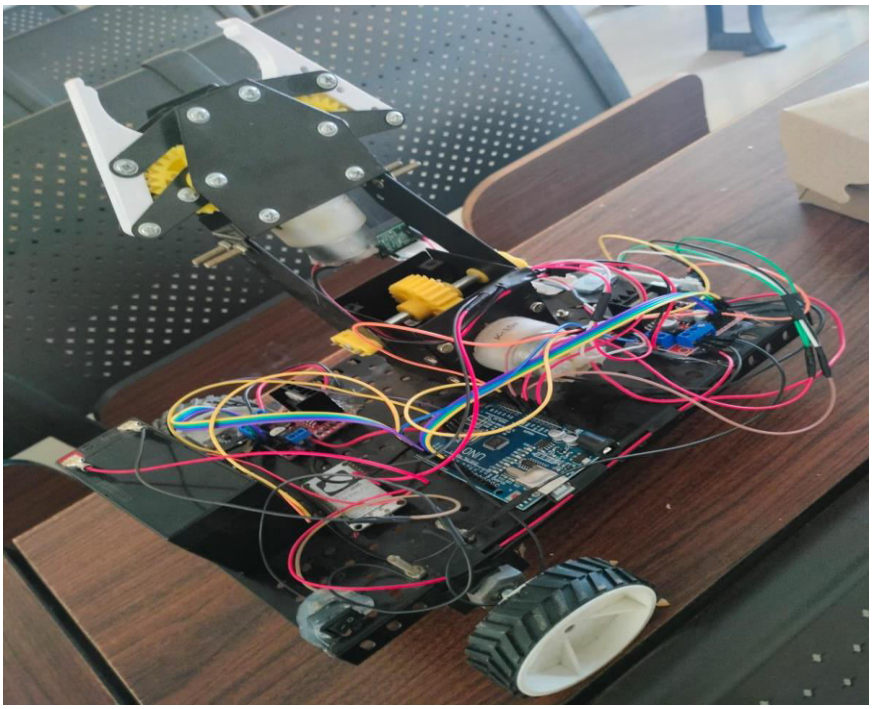


Fig.2 : Snapshot of robot

VI. CONCLUSION AND FUTURE WORK

- In the present world automation is need of the hour, as attitude of humans is moving towards saving time and money, where implementing robots to do certain tasks instead of man power can save both time and money.
- The proposed library automation technique can do the task of library management and warehousing very efficiently without human intervention.
- Since the robot has the knowledge of location and availability of all the books in the library the time for searching is reduced.
- The proposed automation technique will encourage people to read books and to not depend much on softcopies as it has its own disadvantages.

REFERENCES

[1] Y. Angal and A. Gade, “Development of library management robotic system”, 2017 International Conference on Data Management, Analytics and Innovation (ICDMAI), Pune, pp. 254-258, 2017.
[2] J. Thirumurugan, M. Vinoth, G. Kartheeswaran and M. Vishwanathan, "Line following robot for library inventory management system," INTERACT, Chennai, pp. 1-3, 2010.
[3] DaliborPetkovic, MirnaIssa, Nenad D. Pavlovic, Lena Zentner , Zarkoojbasic, “Adaptive neuro fuzzy controller for adaptive compliant robotic gripper”, Ilmenau University of Technology, Faculty of Mechanical Engineering, Department of Mechanism Technology, P.O. Box 100565, 98684 Ilmenau, Germany, Elesevier Journal(online).
[4] MehranPakdamanTabari Institute of BabolKeshvari Square, Babol, Mazandaran IRAN, M. Mehdi SanaatiyanMazandaran Institute of Technology Faculty of Computer, Kargar Square, Babol, Mazandarn, IRAN, “Design and Implementation of Line Follower Robot”, 2009 Second International Conference on Computer and Electrical Engineering.
[5] Harald Vogt Department of Computer Science Swiss Federal Institute of Technology (ETH) 8092 Zurich, Switzerland, “Efficient Object Identification with Passive RFID Tags”.
[6] Serpanos, D. & Wolf, M. (2018). Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies. Retrieved from: https://doi.org/10.1007/978-3-319-69715-4
[7] Yoder, M. A. &Krinder, J. (2015). BeagleBone Cookbook: Software and Hardware Problems and Solutions. 1005 Gravenstein Highway North, Sebastopol, USA: O’Reilly Media, Inc.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.165

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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