

Library Assistant Robot

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Abstract—The utilization of robots in modern generation has developed fundamentally in the previous decades around the world. Interestingly the utilization of robots in different applications is as yet constrained. The use of robots in library application has turned out to be all the more intriguing. Book picking robot is an administration robot which performs assignments, for example, book identifying, picking and delivery it to the librarian and then the book is placed back to the same rack after the return. The procedure of book finding and picking is robotized by this work. The robot will move towards the book and the route of robot is controlled utilizing line following. The automated arm will move near the book and the gripper will close the jaws to get a grip of the book and then the mechanical arm is lifted, later the robot returns the book back to the librarian.

Keywords - *RFID, IR sensor, LCD, DC motors.*

I. INTRODUCTION

Library has many connotations. A library is a collection of information resources and services, organized for use, and maintained by a public body, institution, or private individual. In the more traditional sense, it means a collection of books. Typically, we need a librarian to pick the books and hand it over to the person to whom the books are being issued. This might be an easy task in case the library floor area is small. Also, to search for the books by humans takes a lot of time as many times the books gets overlooked by the human eye. To automate this process of book finding and picking suggested a robot with an arm with some degrees of freedom which will be able to find out the book with the required tag and then pick it and place it on the table. Library assistant robot is a line follower robot to follow a line or path may be a physical mark, already predetermined by the user. IR sensor will trace a black line on white surface. The books are placed in the rack and all the books will be tagged by unique identification (Barcode/RFID tags) and a reader will be placed in the robot. The robot will scan each book and in case the book is found, the arm will pick-up the book from the rack and the robot will move to the librarian table. This controller plays a major role like brains for humans, controlling the robot to navigate all around the work space and to accomplish the given task automatically based on the sensor information and the inbuilt program.

II. RELATED WORK

Many large libraries are facing difficulties in retrieval of books from racks and shelves by human beings as these are very high and large in number to remember the shelf and rack number where the particular book is stored. This is done using the computer system which maintains a database of the book and the location of the book. An experienced librarian can locate the book easily by knowing the book number, rack number and shelf number. In this section, a summary of related works is given.

[1] This paper demonstrates the application of robot in Automation in library management using Lab view robot for library management system. Library administration is an undertaking asset arranging framework for library, used to track things owned, orders made, bills paid, benefactors who have acquired. Usually the librarian need to pick the book and give up it to the one whom the books are being issued. This is difficult task in case the library floor area is large. To defeat this trouble, this paper is creating robotization in library to fast delivery of books using robotic arm. The use of robots characterizes some of modern trends in automation of the modern process. This project is pick and place robotic arm RIO based mechatronic system. EM-18 RFID reader is used to recognize the book. This system helps to keep the records of book. A robot is designed using sensor operated motors to keep track the library book shelf arrangements.

[2] This paper describes a system which uses a mobile robot as a teleported tool for accessing and manipulating remote objects. The purpose of this study is to develop a robot system which helps humans to accomplish remotely a given task in their daily life, based on simple communication and mutual cooperation between them and a teleported mobile robot.

[3] In this paper, Barcode fingerprinting: unique identification of commercial products with the JAN/EAN/UCC barcode, This paper presents work in progress towards a complete system working to assist users in a library. With this aim, the system must be capable to looking for a specific book in a shelf, asked by any user, and whether it is found, deliver it as soon as possible to the user. To get its objectives the system

integrates automatic object recognition, visually guided grasping, and force feedback.

III. OBJECTIVE

1. To design and implement a prototype robot identifying of books on shelves.
2. To develop an automated service robotic assistant

IV. BLOCK DIAGRAM AND WORKING

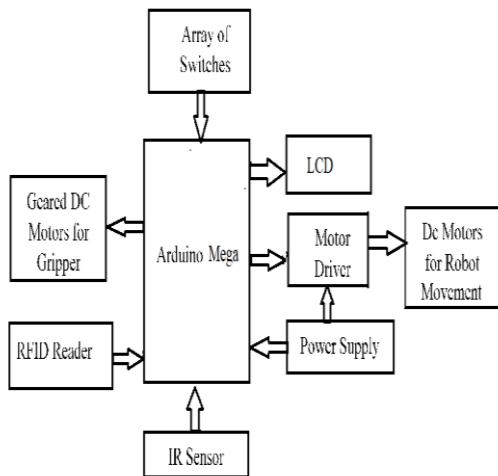


Fig (a) :Block Diagram

WORKING

The library book picking robot is designed as shown below.



Fig (b): Book picking robot Working Principle

The basic working of the system deals with placing of the book to the correct predestined location in the library and place it back to the rack that is specified by the librarian. The working of the robot can be divided to different layers:

- 1) Accepting Input from the librarian for the book to be picked.
- 2) Working of Line following sensors for the movement of robot to the destination
- 3) Reading of RFID tags using an RFID sensor.
- 4) Wrist and gripper mechanism to pick the book.

The Robots continuously waits for Input from the Librarian, push buttons are interfaced to Arduino and continuously checks for the key pressed,

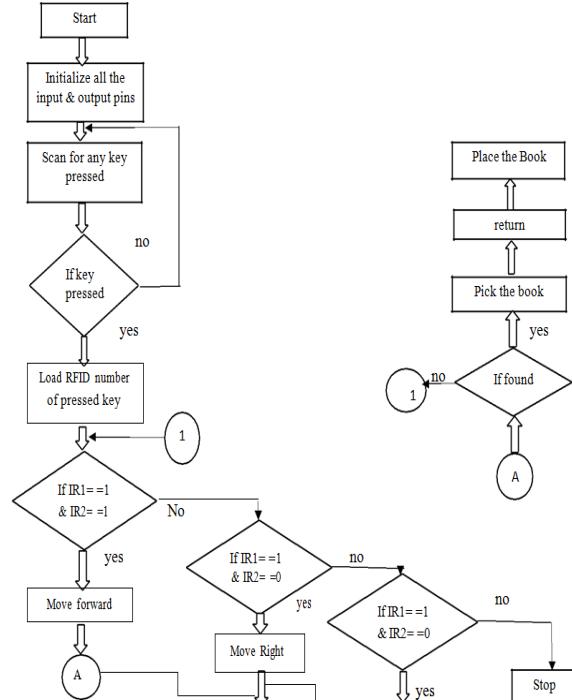
when a key is pressed the Robot moves in a predefined path with the help of IR sensor. The RFID reader continuously reads the RFID cards placed in the book shelves and compares the RFID tag Value with the ID of the book to be found and returns it to the librarian. In the same way ,the book is placed back to rack with the input from the librarian.

A. Line following mechanism

Line follower robot uses IR Transmitters and IR receivers called photo diodes. They are used for sending and receiving light. IR transmits infrared lights. When infrared rays falls on white surface, it's reflected back and caught by photodiodes which generates some voltage changes. When IR light falls on a black surface, light is absorb by the black surface and no rays are reflected back, thus photo diode does not receive any light or rays. Here in this Arduino line follower robot when sensor senses white surface then Arduino gets 1 as input and when senses black line Arduino gets 0 as input

- If left sensor comes on black line then robot turn left side.
- If right sensor sense black line then robot turn right side until both sensor comes at white surface. When white surface comes robot starts moving on forward again.
- If both sensors come on black line, robot stops.

B. FLOW CHART



Fig(c): Flow Chart for the Picking Book

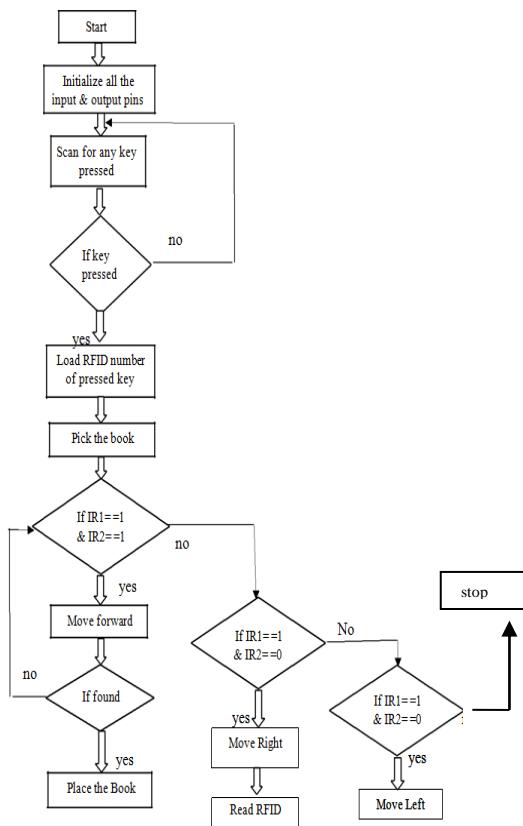


Fig (d):Flow Chart for the Book Placing

V. APPLICATIONS

- Used in libraries of schools, colleges and public libraries.
- Used in sales and book fares to find and pick the book.
- The robot can also be used in industries to pick different items.

VI. CONCLUSION AND FUTUREWORK

A Library Assisting Robot will save the library employees from their time consuming task of book searching. The major task of library employee can be performed at a greater accuracy and reliability. It also helps in reducing labor requirement, time consumption and cost of library management. To automate the process of book picking, we use this robot, which will pick the book from the respective locations. All the books rack will be tagged by RFID tags and an RFID reader will be placed on the robot. The

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