

ABY-A FRIENDLY LIBRARY ASSISTANT

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Abstract – The ability to walk on surface regardless of the present can significantly increase the mobility of a robot for both terrestrial and space applications. Our project describes a two legged walking and carries a basket it contains division to scan and place the book the basket according to its department and it goes to the respective department shelf in the library and the books will be placed. Our robot is done with the help of mechatronics concepts like sensors and coding languages which is studied in the mechatronics. Our robot has the ability to work in library to make the work very efficiently and effectively without wasting the time and the work load on human can be relieved.

Index Terms – Library assistant, RFID, shelf unit, shelf tray

I. INTRODUCTION

Robotics is a key technology in the modern world. Robots have taken their first steps into homes and hospitals, and have seen spectacular success in planetary exploration. In this paper the RFID technology is used. It is mainly focused on the book detection and reducing the human work. Robot technology has been widely deployed into various applications to improve productivity. In particular, a library easily contains hundreds of thousands of books that are frequently borrowed and returned back to the shelves. To facilitate users to easily locate a particular book, books are placed in dedicated areas and sorted in a running sequence based on their so-called call numbers. Library staffs have to ensure that the books are placed in order, an extremely labor intensive and time consuming process. Library staffs first need to perform shelf reading, i.e., manually search for books that are misplaced in the wrong book sequence, then pick up the book and insert it in the correct location. Typically they have 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 a times the books gets overlooked by the human eye. To automate this process of book finding and picking we suggest a robot which will be able to find out the book with the required tag and then bring it to the desk. ie; what we are working towards here is an autonomous robot that will help a library user to find a book and retrieve it from the shelf.

In this project the Barcode technology is used. It is mainly focused on the book detection and reducing the human work. Bar codes are an integral part of most backup and archive procedures but are often taken for granted and implemented without too much thought. However, bar codes can play a much more significant role, embedding intelligence into the

archiving process. A Barcode contains the ID number of the product which can be used by the register to gather information from the server such as its price and name. Robotics is the branch of technology that deals with the design, construction, operation, and application of robots, as well as computer systems for their control, sensory feedback, and information processing. These technologies deal with automated machines that can take the place of humans in dangerous environments or manufacturing processes, or resemble humans in appearance, behavior, and cognition.

Many of today's robots are inspired by nature contributing to the field of bio-inspired robotics. The concept of creating machines that can operate autonomously dates back to classical times, but research into the functionality and potential uses of robots did not grow substantially until the 20th century. Throughout history, robotics has been often seen to mimic human behavior, and often manage tasks in a similar fashion. Today, robotics is a rapidly growing field, as technological advances continue; research, design, and building new robots serve various practical purposes, whether domestically, commercially, or militarily. Many robots do jobs that are hazardous to people such as defusing bombs, mines and exploring shipwrecks.

A library assistant named robot consists of 6 joints having 2 legs with 5 DOF on right leg and 1 DOF on left leg. It also includes a grip on the top in the form of human arm which has 1 DOF to lift and drop the books in respective rows of library. The robot will have binary joints. A basket attached to it will be used to keep the book. The robot will follow a well-defined path as per the instructions given to it. The software used for visualizing will be blender for animation, 3d solid edge, Mat-lab. Programming languages will be written in simple C and Python.

II. EXISTING SYSTEM

This section describes appropriate related works on the development RFID Technology.

Radio Frequency Identification is a new generation of Auto Identification and Data collection technology which helps to automate business processes and allows identification of large number of tagged objects like books, using radio waves. RFID based Library Management system (LMS) would allow fast transaction flow for the library and will prove immediate and long term benefits to library in traceability and security.

The unit cost of including an RFID tag is much more than

the cost of printing a barcode on a package.

A library is a collection of information, sources, resources, books, and services, and the structure in which it is housed. Apart from books many libraries are now also repositories and access points for maps, prints, or other documents on various storage media such as microform (microfilm/microfiche), audio tapes, CDs, LPs, cassettes, videotapes, and DVDs. Libraries have materials arranged in a specified order according to a library classification system, so that items may be located quickly and collections may be browsed efficiently. Reference stacks are different which has only reference books and only selected members.

CDAC Library is a large one having 17,000 books and staffed by both paraprofessionals and professional librarians.

- Circulation: handling user accounts and issuing/returning and shelving of materials.
- Collection, development, order materials, maintain materials' budgets.
- Technical Services work behind the scenes
Cataloguing and processing new material and deaccessioning weeded materials.

Basic tasks in library management include the planning of acquisitions of materials, arranging the acquired materials according to the library classification, preservation of material the deaccessioning of materials, patron borrowing of materials, and developing and administering library computer systems.

This system will automate the following tasks using RFID technology,

- Accessing number of books at a time.
- Searching a particular book to check its presence in the library.
- Locating the physical location of the book.
- Accounting/Stock verification of the materials.

The RFID based LMS facilitates the fast issuing, reissuing and returning of books with the help of RFID enabled modules. It directly provides the book information and library member information to the library management system and does not need the manual typing. It also provides monitoring and searching system. The monitoring module will continuously monitor the movement of books across the gates, so that the books taken out without prior issuing will be traced out easily and will alarm the librarians. The searching module provides the fast searching of books using RFID handheld reader. The physical location of the books can be easily located using this module.

Utmost care has been taken to provide following features to the Library using RFID technology:

- To remove manual book keeping of records
- Traceability of books and library members as they

move.

- Improved utilization of resources like manpower, infrastructure etc.

Less time consumption as line of sight and manual interaction are not needed for RFID - tag reading.

- To provide 2 meters read range antennas
- To minimize the manual intervention
- To minimize the manual errors
- To provide the long lasting labels
- To provide fast searching of books

III. SOFTWARE REQUIREMENT

Keil was founded in 1982 by Günter and Reinhard Keil, initially as a German GbR. To use μ Vision, some general concepts, common to many screens and to the behavior of the development tool, are presented. In our continuous effort to deliver best-in-class development tools, supporting in daily work, μ Vision has been built to resemble the look-and-feel of widespread applications. Keil is software that is used to develop the source code of the ATMEL microcontroller. Keil is a Window based Integrated Development Environment (IDE) for the Microchip Technology Incorporated ATMEL micro microcontroller families.. The reason of choosing Keil is because it is widely used and the language is easy to understand.

IV. HARDWARE REQUIREMENT

Microcontroller is a single chip that contains the processor (CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit and time. It is designed for a small set of specific function to control a particular system. For example, microcontroller is used in wheelchair to controller the motion using remote control. The reason of using microcontroller is because the microcontroller has the ability to store and run unique programs make it extremely versatile.

RFID systems can be classified by the type of tag and reader. A Passive Reader Active Tag (PRAT) system has a passive reader which only receives radio signals from active tags (battery operated, transmit only). The reception range of a PRAT system reader can be adjusted from 1-2,000 feet, allowing flexibility in applications such as asset protection and supervision.

An Active Reader Passive Tag (ARPT) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. An Active Reader Active Tag (ARAT) system uses active tags awoken with an interrogator signal from the active reader.

A variation of this system could also use a Battery Assisted Passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal.

Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for when tags go in and out of the

interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

Radio-frequency identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response.

RFID tags can be either passive, active or battery assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery assisted passive (BAP) has a small battery on board and is activated when in the presence of a RFID reader. A passive tag is cheaper and smaller because it has no battery.

The aim of this paper is to discuss about the arrangement of the books on the shelf by the Robot. Next, the step is point out the book by the Robot. Further, the experiment including results and findings are elaborated. Finally, this paper concludes by discussing some possible works for the future.

V. PROPOSED SYSTEM

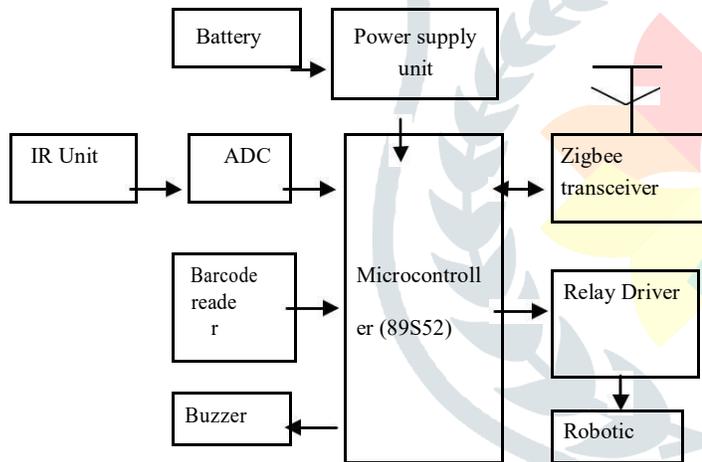
The proposed system consists of three main units:

- Barcode Reader
- Zigbee Transceiver
- Buzzer

The figure above depicts the proposed design of the Robot.

The system elements consist of various sub systems.

ROBOT SIDE:



SYSTEM SIDE:

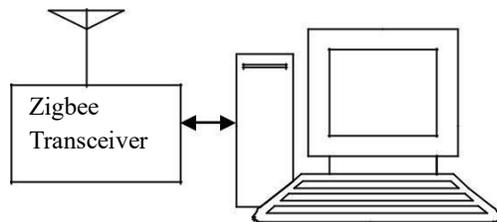


FIG: PROPOSED BLOCK DIAGRAM

BARCODE READER:

A barcode reader is an electronic device for reading printed barcodes. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barcode readers contain decoder circuitry analysing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.

VI. SCOPE OF THE PAPER

This paper aims to build and design the Library Assistant Robot which has the capability to look for a specific book in a shelf, asked by any user, and when it is found, to deliver it as soon as possible to the user. Tracking of items on shelves is an important but time-consuming task in inventory control. In particular, books in public libraries are frequently borrowed and returned, even misplaced, and proves a challenge to be tracked on a daily basis. This Library assistant robot is an autonomous service robotic assistant whose functionality includes the assistance of individuals within a library environment.

VII. SOCIAL IMPACT

Today, it is increasingly common for people to use or come into contact with robots in various situations at home and in retail stores, hotels and hospitals. Robots are classified into several types based on their functionality (service and utility robots or those designed to communicate with humans) and appearance (humanoid robots or mechanical robots). The type of robot, to which each country attaches particular importance in the advance of robotics, reflects the sense of values and preferences of its population.

Nomura Research Institute, Ltd. (NRI) has conducted a consumer survey in Japan, the U.S. and Germany on the topic of robots and artificial intelligence (AI). In Japan, respondents often associate the term "robots" with "humanoid robots" that can communicate with humans and they have a high level of familiarity with robots. Of the three countries, the U.S. has the highest level of robot utilization at home and in retail stores with its people being the most enthusiastic about the future use of robots. Germany shows a strong tendency to consider robots for industrial purposes, and its people feel strong resistance to the presence of robots in their households.

Japanese consumers generally have positive attitudes towards robots. However, survey findings revealed that they still lack sufficient knowledge about robots and therefore think the rise of a robot society is still far in the future, causing them to not carefully consider the correlation between humans and robots. As a society, now is the time to properly understand and think about how humans should accept the potential of robots—and the artificial intelligence technologies that support the development of robots—which may essentially change our way of living. Given Japan's rapidly aging population, there are a higher number of people who expect to utilize nursing care robots. As such, Japan is likely to see its market for nursing care robots ahead of the rest of the world.

The number of opportunities for American consumers to come in direct contact with robots has been increasing in the business-to-business-to-consumer (B2B2C) fields such as those installed by retailers in stores, and is expected to grow further. Robots of this and similar types include

- (1) Ones that help consumers find items in stores,
- (2) Room-service robots in hotels,
- (3) Medical robots that deliver telemedicine service to patients and
- (4) Library assistant robot.

These robots are designed to assist consumers in receiving more convenient services.

We will initially test in our college library and will get the full survey report on that and even in college project exhibition also. We know something that our society is a robot friendly. By the after 5-10 years, we will work furiously with a robot. This type of robot or a library assistant is useful in the library as the name said library assistant. This type is at present at work, but ours is different from others like it is a human type and even image processing sensor are used. If we implement this type of robots, the manpower reduces. We all know librarians should take the lots of books in a basket and to place in a mentioned rack is difficult to handle it. Hence, we come across with a library assistant robot for work.

VIII. RESULTS AND DISCUSSION

The experiments were conducted to evaluate the performance of the proposed method. The results presented in this paper mark the beginning of our efforts to build a robot for detecting the books. This circuit is designed for book detection and to place the book in the respective rack. The IR sensor is used to sense and detect the book. When the person replaces the book to the library the robot is ready to take the book and keeps in respective rack. Even when the librarian types the book name, the robot will be ready to search the book. As soon as it identifies the book, it produces alarm sound. If the book is not available in the library it will display it on the librarian system.

IX. CONCLUSION

In this paper the proposed system give the result of find the book and place the book. Misplacing of the books can be identified easily. It reduces the manual work. With the proposed architecture, if constructed with at most accuracy, the robot will pick and places the book. If such a system is developed, it will act as a basic platform for the generation of more such devices for the book picking and placing.

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