

# THE LIBRARY MANAGEMENT ROBOT

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**Abstract:-** This paper demonstrates the application of Robot for library inventory management system. A robot is designed using sensor operated motors to keep track the library book shelf arrangements. Robot get the data of book which going to be search from the pc through Zigbee, The robot carries a barcode reader which collects the barcode data from the books arranged in a vertical manner and compares the decoded barcode data with the input. If the particular book which is to be found out by the robot, then the robot gives location of the book to the librarian's system through Zigbee, in which the robot is used for searching purpose. In case of any difficulty faced by the robot when it does the searching process, the robot halts and sends an alarm. Misplaced books can be identified using the pre-programmed data in the robot which helps to maintain the books in an order. This helps and simplifies the job of monitoring the arrangement of books and also reduces the manual routine work done by the library staff.

**Index Terms-** IR unit,Zigbee transceiver,Relay driver,Battery, Buzzer,ADC,Barcode Reader.

## I.INTRODUCTION

A robot is a mechanical or virtual agent, usually an electro-mechanical machine that is guided by a computer program or electronic circuitry. 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 it's 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.

The Asimov laws of robotics :

- A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.
- A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

It provides a very powerful and flexible approach to demonstrate a variety of engineering concept.Robots are used internationally by Police, Army, Navy and Air force organisations. Robotic technology is used to deal with hazardous situations such as dealing with suspicious packages, rates and for the collection of foreign intelligence. robot, any automatically operated machine that replaces human effort, though it may not resemble human beings in appearance or perform functions in a humanlike manner. By extension, robotics is the engineering discipline dealing with the design, construction, and operation of robots.The

paper is organized as follows. Section II describes the methodology of RFID technique. Section III describes the proposed system based on the Barcode technique with Arm. Section IV comprises of Result and Discussion. Finally Section V comprises of Conclusion.

## I. EXISTING SYSTEM

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

Radio Frequency Identification is a new generation of AutoIdentification 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.

UHF RFID readers, supported with antennas at gate and transaction sections, and library cards containing RFID - transponders which are able to electronically store Information that can be read / written even without the physical contact with the help of radio medium. This paper presents the experiments conducted to set up RFID based LMS.

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 de accessioning 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 de accessioning 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

### 2.1 Software Techniques:

Keil was founded in 1982 by Günter and Reinhard Keil, initially as a German GbR. To use  $\mu$ Vision, some general concepts, common to many screensland to the behavior of the development tool, are presented. In our continuous effort to deliver best-in-class development tools, supporting in daily work,  $\mu$ 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 Environmental (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.

### 2.2 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.

A 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 self by the Robot. Next, the steps 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.

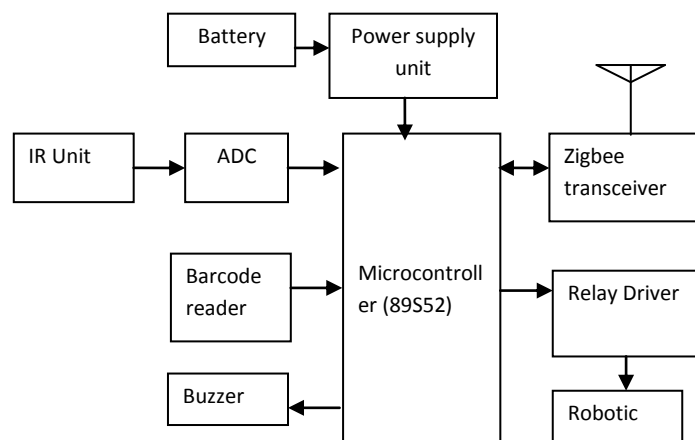
### III. PROPOSED SYSTEM

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:

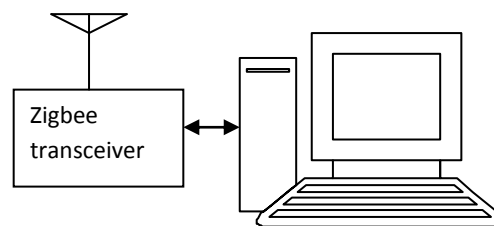
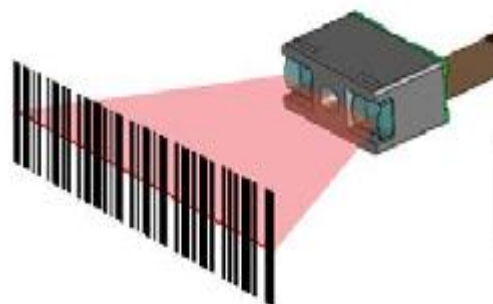


FIG 3.1 PROPOSED BLOCK DIAGRAM

#### 1. 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 analyzing the barcode's image data provided by the sensor and sending the barcode's content to the scanner's output port.



### Fig1-Barcode Scan Engine

The Marson MT700 Middle Range Mini Barcode Scan Engine is World's Smallest Barcode Engine. It is an 32bit ARM, UART/USB. It's Scan Barcode 240 Scans/Sec .

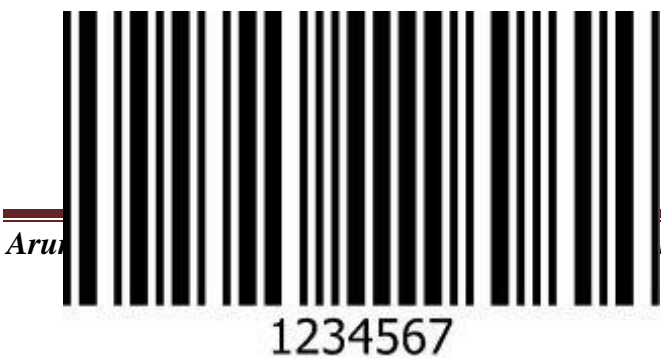
The Feature of the barcode scan engine is

- Small and Compact size
- Quick & easy integration
- Excellent scanning performance
- Wide range applications
- Highly Compatible Interfaces
- Outstanding Scan Rate
- Reliable Reading Performance

MT700 is designed to be easily integrated into OEM Customers target systems and hardwares which need 1D barcode decoding features and solutions. MT700 1D Barcode engine combines the latest CMOS sensor technology with a light weight optical module. It's compact enough to be easily mounted on small and foot print, providing the same features and benefits of handheld 1D barcode scanning products. A barcode reader or scanner, also known as a point of sale (POS) scanner is a hardware device capable of reading a barcode and printing out the details of the product or logging that product into a database. A perfect example of a barcode reader is a super market barcode scanner that reads and logs the price of a product. The figure2 shows the Barcode.

Today many smart phones with the proper apps are also capable of scanning and reading barcodes. Lines of different widths and sizes representing data, that when read will determine what the scanned object is. Barcodes are often used to help organize and index information or prices about an object. Barcodes used by the U.S. postal service that helps speed the delivery of mail is another perfect example of how a barcode could be used. In the picture to the right, is an example of what a barcode for an address may look like.

A barcode is an optical machine-readable representation of data relating to the object to which it is attached. Originally barcodes systematically represented data by varying the widths and spacings of parallel lines, and may be referred to as linear or one-dimensional (1D). Later they evolved into rectangles, dots, hexagons and other geometric patterns in two dimensions (2D). Although 2D systems use a variety of symbols, they are generally referred to as barcodes as well. Barcodes originally were scanned by special optical scanners called barcode readers. Later, scanners and interpretive software became available on



devices including desktop printers and smartphones.

### Fig2-Barcode

#### 2.ZIGBEE TRANSCEIVER

ZigBee is a specification for a suite of high level communication protocols used to create personal area networks built from small, low-power digital radios. ZigBee is based on an IEEE 802.15 standard. Though low-powered, ZigBee devices often transmit data over longer distances by passing data through intermediate devices to reach more distant ones, creating a mesh network; i.e., a network with no centralized control or high-power transmitter/receiver able to reach all of the networked devices. The decentralized nature of such wireless ad hoc networks make them suitable for applications where a central node can't be relied upon.

ZigBee is used in applications that require a low data rate, long battery life, and secure networking. ZigBee has a defined rate of 250 Kbit/s, best suited for periodic or intermittent data or a single signal transmission from a sensor or input device. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range wireless transfer of data at relatively low rates. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth or Wi-Fi.

#### Features

- Low current consumption & low data rate
- Efficient SPI interface (CC2500)
- High sensitivity
- Long battery life
- Operating voltage : 1.8 ~ 3.6 Volts
- Available frequency : 2.4-2.483 GHz
- Secure networking
- Easy for application.

#### IV.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. The IR sensor is used to sense and detect the

book. When the librarian type 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.

#### V.CONCLUSION

In this paper the proposed system give the result of find 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 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.

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