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Smart Cart For Accessing the Library Catalogue

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Abstract

In recent days, Whenever someone wants to take a book from library he or she has to go through all the books available in library related to the particular subject. Even if the book is not available in that library, the user will have to search the entire department. Also the manual work done by the librarians is tedious as they have to organise the books as per the department and also have to maintain the records To summarise the present day library system is not efficient and need improvement with the advance technology . To solve the problem of manual work done in the present day library system, we propose the idea of using a smart cart for accessing the library catalogue. It will automate the process of borrowing a book or issuing a book or any other literature available in library. We propose to use an intelligent system that reduces the manual work and fastens the processes in a library. Also we can merge the data- bases of various public libraries available in a particular city and provide the information to the citizens so that it will be easier for them to go to only that specific library which has the book instead of browsing through all the libraries and moving from place to place .

I. INTRODUCTION:

In recent days library system is based on manual work done by the librarians and other staff members. It is necessary to get rid of this tedious job and to increase the productivity of employee as well as meaningful to the users who are visiting it. So. proposal of introducing the technology with some new advancement lead to make the automated library that will be user friendly and serve the purpose of originality to its user. To make it possible, it contains the different modules that should be integrated to each other and act as a one system namely database management

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system (DBMS), Robotic arm, Communication system, barcode scanner, and notification system. These modules are connected in such way that to make library system automated. A database of books with the specification is created and stored in computer. A communication system will developed that will command the robotic arm to select the desired book with the help of barcode scan- ner in the rack of cupboard and book will be issued to the counter. Notification system will work as reminder to its user. This project is mainly dependant on how error free communication takes place between DBMS and how accurately robotic arm follow the commands. Robotic arm is basic -3 degree rotational arm with rotational and linear motion with wheel base having a sensors to find the distance. One of the possibilities that can be implemented is the objective of this project to reduce the time consumption and manual work by increase the use of libraries by merging the various libraries in a particular city. We'll see details of each modules in following sections.

II. LITERATURE REVIEW:

Prior art search shows that automation of libraries was tried to be implemented using RFID [2]. The authors proposed to use the RFID for library automation system in order to keep track of books [5]. The concept of RFID can be viewed as an extension to electronic barcode, which can be used to identify, track, or detect holdings in the daily maintenance of library. This system, consist of smart RFID tags, that provides libraries with more effective way of managing their collections while providing greater customer service to their users. The technology works on small and thin tags, which allows it to be placed on the inside cover of each book in a library's collection. Also the mentioned the use of GSM to notify users about the status and availability of the books [4/7]. But the paper not mentioned any automatic control for the movement of books from the position in library to the counter or vice versa. The concept of automation using robotic arm was also proposed using wireless technologies [6/8]. Library automation, stated in single term, is the application of computers and utilisation of computer based product and services in the performance of different library operations and functions in provision of various services and production of output products. Idea of merging various libraries of a particular city was proposed at many places such as Brooklyn. Hence the various parts of project proposed by us have been a part of one or other attempts for automatic management of library.

III. OBJECTIVE:

This paper describes the implementation of an automatic library management system using a robotic arm to arrange the books in library and a notification system with the help of

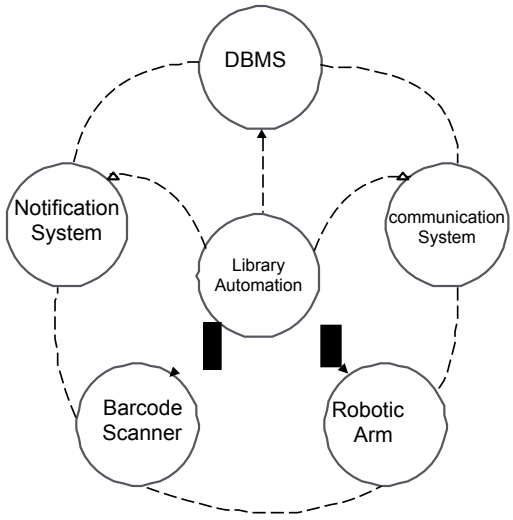

FIG 1) SYSTEM DESIGN

GSM module to notify the library members about availability of the book and date of return or renewal.

IV. MODULES:

1. Raspberry pi:

The main part of this project is Raspberry pi board. It operates on linux based open source operating system. It has two versions. : Wifi operated and ethernet operated. In this project, we are using Wifi operated version. Raspberry pi has Application specific RAM. It contains GPIO header, USB ports, HDMI port, Ethernet socket, micro USB port, camera connector, display connector and 3.5mm audio jack. As Raspberry-Pi does not contain any storage facility, it contains a micro SD card slot. Raspberry pi will control the movement of robotic arm as well as the conveying of instructions be- tween the cart and library database. The database will indicate the present books and about their location. Once the smart cart gets the information about the location of particular book , it will move that location to pick or place the book in the stack.

2.RF module:

A radio frequency module is an electronic device used to transmit and receive radio signals between two devices i.e. it is used for communication. In an embedded system it is used to communicate with another device wirelessly. It is used for communication between the computer user for user interface and the smart cart. It instructs the robotic arm to get a particular book from particular location. It operates on carrier frequencies which are commonly used such as including those in the industrial, scientific and medical (ISM) bands. These frequencies are used because of national and international regulations governing the use of radio channels. Short range devices may also use frequencies available for unlicensed. RF modules may be compatible with a such as Zigbee , Blue- tooth low energy, or Wi-Fi, or they may implement a another proprietary protocol. It is the wireless communication module which will convey the messages from database management system to the smart cart and vice versa. It consists of transceiver antennas attached to each of the devices and also a decoding receiver to decode the transmitted information.

3. Barcode scanner:

It consists of a light emitter , a lens and a light detector which will be translating optical signals into electrical signals. Also all barcode scanners contain decoder circuit that will analyse the barcode's image data provided by the sensor and send the barcode's content to the output port of scanner. Barcode scanner is attached in the system to provide verification of the picked book by the robotic arm. It avoids picking of wrong book.

4. GSM module:

GSM module is used to establish link between a computer and a GSM system. Global System for Mobile communication is an architecture widely is used for mobile radio communication in most of the countries. It consists of a GSM modem together with power supply circuit and communication interfaces for computer. GSM modem is a class of wire- less modulator and demodulator devices that are developed for communication between computer and the GSM network. A GSM can perform the following operations : Receive, send or delete SMS messages in a SIM. Read, add, search phone-

book entries of the SIM. Make, Receive, or reject a voice call. It digitises and reduces the data, then sends it down through a channel with two different streams of client data, with each in its own particular time slot. The GSM module will be communicate with database management system. The database will evaluate the records at the starting and at the end of the day and will ask the notification system to inform the members about status of the books. The members who have enquired for the book will get the information about availability whereas the members who have already issued the books will be informed about returning date or renewal period.

5. Cartesian (3D) robotic arm:

A Cartesian coordinate robot is an industrial robot. It has three principal axis of control are linear (i.e. they move in a straight line rather than rotate) and are perpendicular to each other. The three sliding joints correspond to moving the palm up and down, in and out, back and forth. Other advantages are, this mechanical arrangement gives simple the robotic arm control solution. It is used for picking up the desired book from the rack and placing the same in the cart which will eventually be placed on the counter by moving line follower cart. The robotic arm will be attached to a smart cart which is instructed about the movement of cart to the location of the requested book.

V. SYSTEM RELATED TO PAPER:

1. Library Integration System:

In our system we are integrating the library database. The library database integration help user to locate and issue a book available in another library. The integration system is more effective for a single city.

2. Hardware Implementation:

Precision of Robotic arm is more important.Line following principle will help to it.GSM modules will be the part of the notification system which notifies the user about the last date of submitting the books.

FIG.2) ARM

3. Software Implementation*:*

Database Management and User Interface is software part. Apart from this, designing an algorithm to locate the book to reduce the total time requirement is also included as a software.

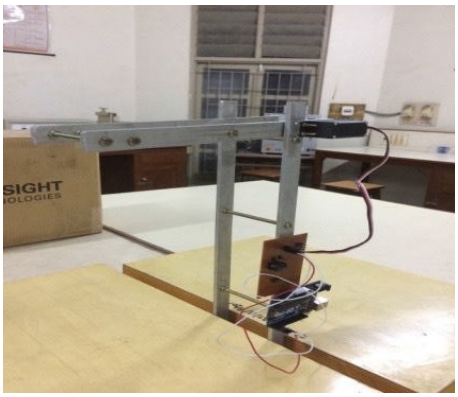

FIG.3) DESIGN OF ROBOTIC ARM

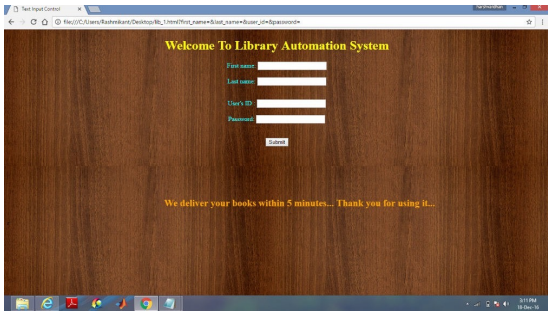

FIG.4) FRONT PAGE IMPLEMENTATION

VI. FUTURE SCOOPE:

Library Automation will reduce the time requirements to per- form the task. Using '*Artificial Intelligence'* for making more reliable cart.Integration of more libraries database is a very important parameter which can be added. Notification system can be implemented which helps the users to access the re- sources easily and also used for the renewal of books at the end of fixed time period.

VII. CONCLUSION:

By this project we are implementing a system that integrates the resources of all the libraries available in one particular area or city. It also implements a notification system which helps the users to access the resources easily. The location of the book is further decided by the book name or the ISBN number that the user enters in the provided GUI. The computer system locates the book on stack and then through RF module instructs the robotic arm about the location. Also this system will reduce the human labour and improve the accuracy in arrangement of resources so that they can be accessed easily.

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