DESIGN OF SMART LIBRARY ASSISTANT ROBOTIC *SYSTEM*

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Abstract: This project describes the smart library assistant robotic system with a GSM module. A conventional library system for returning and issuing books was much time-consuming. For minimizing human efforts, we design the smart library system in this, we have to check the availability of a book with the help of a GSM module. A robotic arm is used to pick up the book and place the book with the help of the trolley. The RFID tag is used to identify the book which reduces the manual interference for returning and issuing a book.

***Keywords: GSM, RFID tag, Robotic arm, Trolley etc*.**

I. INTRODUCTION

A library is a collection of books with a very large number of readers of their books and therefore managing the library is a very difficult task for a librarian. Returning and issuing books in the library was a tedious task which consumes much time. For reducing this time, we develop a smart library assistant robotic system with a GSM module. This intelligent system works on the basis of programming using python and Microsoft Access. The objective of the project is to develop the design of a smart library assistant robotic system with a GSM module. In-library numbers of books are available, the GSM module is used to check the availability of books and robotic arm are used for the place the book in a proper way in a rack. The RFID tag is used for the identification of book numbers and shelf number and then picks up and place the book which we required.

II. HARDWARE

.The various section of the smart library assistant robotic system is as

- GSM Module
- Robotic Arm
- RFID reader
- Microcontroller (AT mega 328)

1] GSM Module

In this project, we used a GSM module to check the availability of a book that conveys the message to a user. A GSM module is a chip or circuit that will be used to establish communication between a mobile device and a computing machine. GSM stands for **Global System for communication** GSM/GPRS is a class of wireless modem devices that are designed for communication of a computer with the GSM and GPRS network. It needs a SIM card a bit like mobile phones to activate communication with the network.

2] Robotic Arm

A robotic arm is used for pick and place books in a rack and it forward towards the counter. A robotic arm has a two degree of freedom for up and down movement. It also has a mobile base which is for forwarding movement of the arm and backward movement of the arm. The robotic arm will pick and place the book as predefined. Types of a robotic arm as follows;

- Cartesian Robot / Gantry Robot
- Cylindrical Robot

- Spherical Robot
- SCARA Robot
- Articulated Robot
- Parallel Robot
- Anthropomorphic Robot

3] RFID Reader

The RFID tag is used for book number and shelf number identification and then picks up and places the required book. The RFID technology is an automatic and data collection technology that uses electromagnetic and radio frequency range for non-contact operation. RFID Technology is comparable to it of bar codes or magnetic strips i.e. they all provide a unique identification system. In RFID barcodes and magnetic strips must be scanned against their corresponding readers and similarly, RFID devices must also be scanned or swiped against their readers. RFID reader does not require any physical contact RFID is a wireless technology it contains two components RFID card or RFID reader. In this project RFID EM -18 reader module is used.

4] Microcontroller (AT mega 328)

AT mega 328 is a high-performance

Microchip 8-bit AVR RISC-based microcontroller. It combines with 32 KB ISP flash memory with read-write capabilities. It can handle 8-bit data size it operates a 3.3V to 5V. Atmega328 is an associate degree Atmel microcontroller, which is used in Arduino UNO board. AT mega have 28 pins in total it has three ports in total which are named as Port B, port C and port D it works a quartz oscillator for generating the frequency.

III. SOFTWARE

1. PCB Design

Proteus design software is used for PCB design. The Proteus design is an electronic circuit design software which includes schematic capture, simulation, and PCB (Printed Circuit Board) Layout modules.

2. Arduino Software

Arduino software contains (IDE) contains a text editor for writing code, message area, text console, a toolbar with common functions and serial menu. The Arduino integrated development atmosphere may be a cross-platform application that's written within the artificial language Java. It is accustomed to write and transfer programs to the Arduino board. The ASCII text file for the IDE is discharged underneath the antelope General Public License.

3. Python

Programming is done in python language. Python is an integrated high-level programming language. Python language used for developing desktop and web application. python supports many operating systems. It also used for developing websites and numeric application python is designed with features and facilities for data analysis and visualization.

IV. METHODOLOGY

When we enter a college library first we have checked the availability of book with the help of GSM module. If the book is not available, then GSM sent a message to the user about the availability of the book. After receiving a message we entered a book name which we want to issue. The input is given to the robot. The information provides to the microcontroller AT mega 328 according to the data which is received, a robotic structure is moved. An RFID tag attached to the book and RFID reader is placed in the robot arm. RFID scanner read the data of the book which is saved in the RFID tag. This information sent to the microcontroller and the robotic arm picks the book and put in a tray. The tray carries the book to the issue counter. For returning the book same process would be followed.

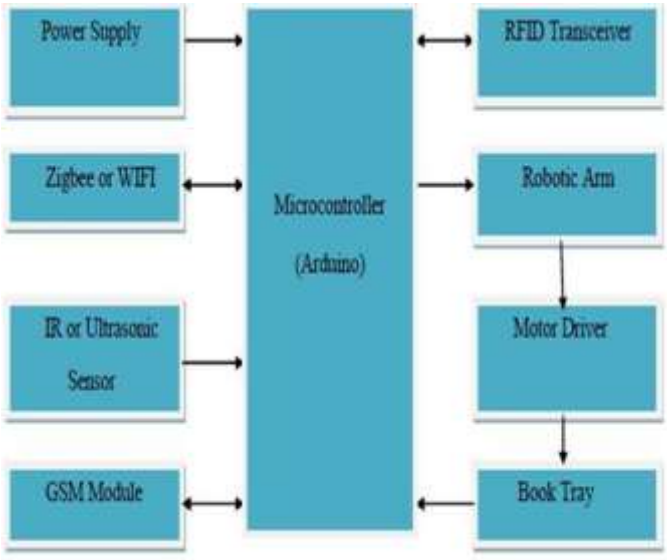

Fig1: Block diagram of a purposed system

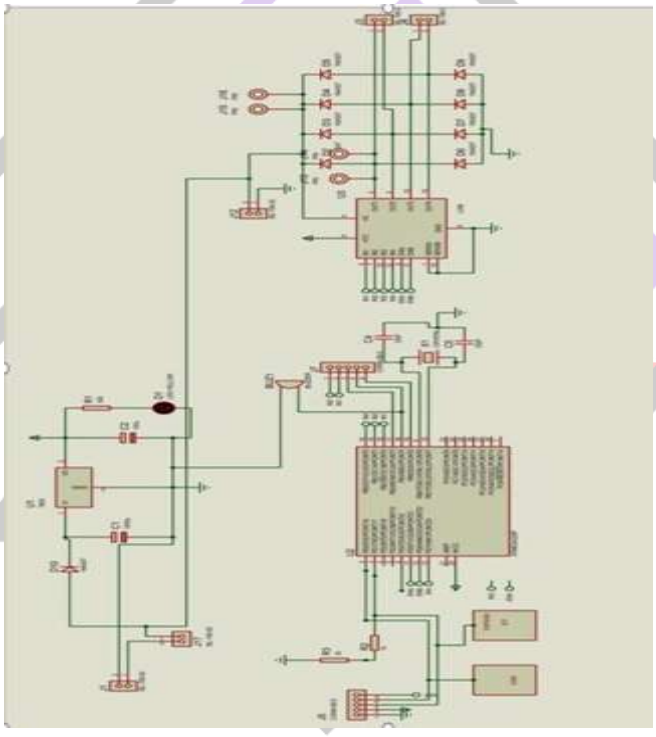

Fig 2: Circuit diagram

CONCLUSION

We develop a robotic automated library system that will help us to use library resources efficiently, like library databases, finding books and showing user profile. The library database is also updated with book issued or returned. Because of electronic and mechanical automation, it reduces the time required for library management tasks. It reduces human interception so the user will get the book faster and the user can easily check the availability of a book from its own place within a campus. The idea of library automation is often achieved with the assistance of this project.

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