

Development of RFID Library Management Information System

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Abstract: RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling. This technology helps librarians reduce valuable staff time spent scanning barcodes while charging and discharging items. RFID is a combination of radio -frequency-based technology and microchip technology. The methodology used was serial communication in addition with embedded systems. RFID reader was used for the .serial communication, RFID tag was put inside the books for easy identification and retrieval of books while 8051 microcontroller was used as the programming of the complete systems. It is important to educate library staff and library users about RFID technology before While library RFID systems have a great deal in common with one another, including the use of high frequency (13.56 MHz), passive, read-write tags, lack of a standard and compatibility of tags produced by different vendors is a major problem in implementation of RFID in libraries. Current standards (ISO 15693) apply to container-level tagging used in supply chain applications and do not address problems of tracking and hot listing

Keywords: RFID Reader, RFID Tag, 8051 microcontroller, Librarians

I. Introduction

RFID based systems are going to revolutionize the entire library automation systems. In this project we are going to develop library automation system, which will track the books, whether they are issued or they are in library, so that library user will get the instant information. RFID can be used library circulation operations and theft detection systems. RFID-based systems move beyond security to become tracking systems that combine security with more efficient tracking of materials throughout the library, including easier and faster charge and discharge, inventorying, and materials handling (Abdullah et al, 2011).

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This technology helps librarians reduce valuable staff time spent scanning barcodes while charging and discharging items. RFID is a combination of radio -frequency-based technology and microchip technology (Dai, 2011). The information contained on microchips in the tags affixed to library materials is read using radio frequency technology, regardless of item orientation or alignment (i.e., the technology does not require line-of-sight or a fixed plane to read tags as do traditional theft detection systems). The RFID gates at the library exit(s) can be as wide as four feet because the tags can be read at a distance of up to two feet by each of two parallel exit gate sensors.

II. Review Of Related Work

While there are over 500,000 RFID systems installed in warehouses and retail establishments worldwide, RFID systems are still relatively new in libraries. Fewer than 250 had been installed as of the first quarter of 2004. Most installations are small, primarily in branch libraries. The University of Connecticut Library; University of Nevada/Las Vegas Library, the Vienna Public Library in Austria, the Catholic University of Leuven in Belgium, and the National University of Singapore Library are the only sites that appear to have tagged more than 500,000 items each. So far in India, only two University libraries have adopted the RFID system. First among them is Jayakar Library of Pune University and second is Dhanvantri Library of Jammu University. The use of RFID throughout Indian libraries will take at least four to five years (kalyani, 2014).

Recent developments in hardware and software for RFID systems have increased the potential of this technology in library automation and security. Today, the one important result for libraries is the ability to use

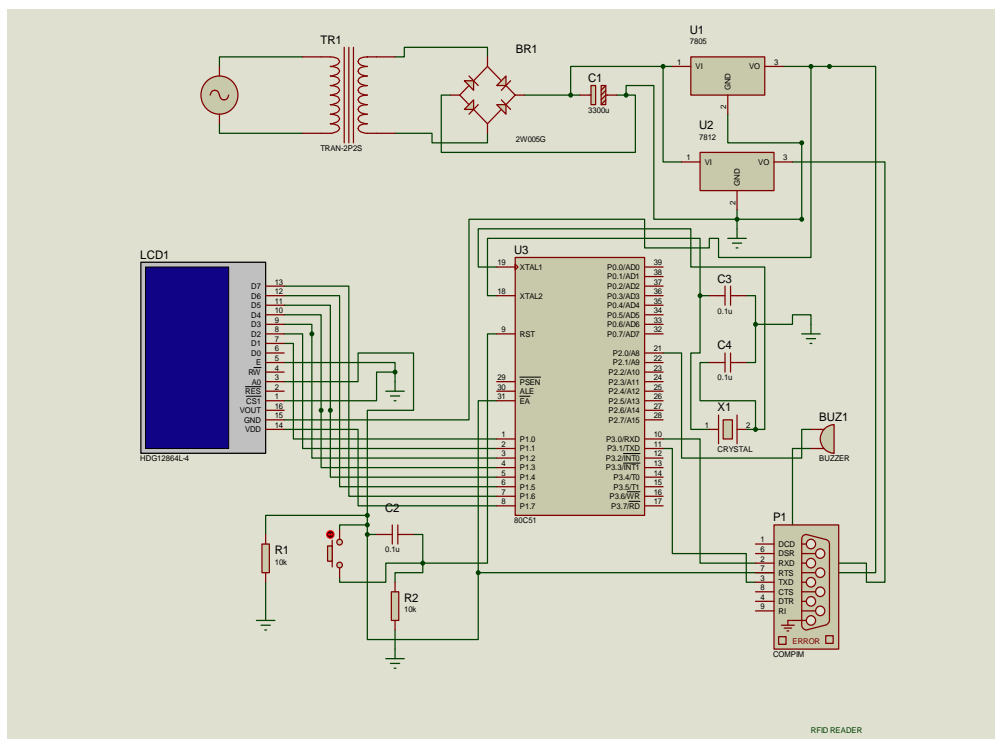
non-proprietary systems, now that the new generation of RFID-chips with standard ISO 15693 (to be integrated into ISO 18000-3) is available,' explains Dr Christian Kern, system development manager of Bibliotheca RFID Library Systems, a Swiss company specializing in such systems for libraries. "With this technology, libraries do not have to depend on one single supplier for tags (Kuen, 2007).

Zhang (2011) RFID exit gate sensors (readers) at exits are basically two types. One type reads the information on the tag(s) going by and communicates that information to a server. The server, after checking the circulation database, turns on an alarm if the material is not properly checked out. Another type relies on a "theft" byte in the tag that is turned on or off to show that the item has been charged or not, making it unnecessary to communicate with the circulation database.

III. Methodology

3.1 Overview of Library Automation

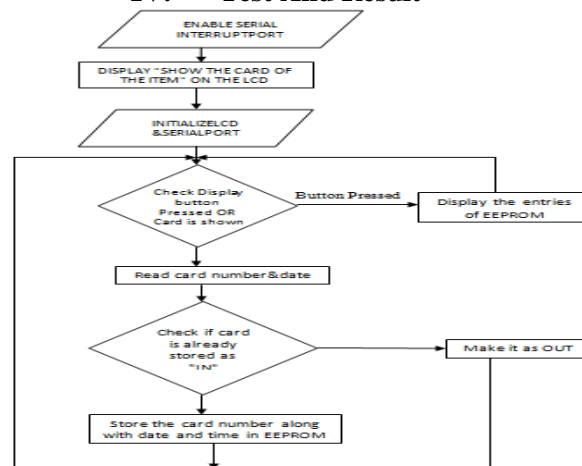
Whenever someone needs any book from the Library to be issued, he needs to insert his smart card into the Smart Card Reader placed in the Library. The Controller checks whether the student got membership or not (Smart Card Validation) by communicating with Smart Card Reader. If the Card is proved to be valid then the student is allowed else buzzer will buzz. The communication between the microcontroller and Smart Card Reader is through Serial Communication. The MAX-232 forms the driver between the Card reader and controller then the student details are displayed on LCD which is interfaced to the microcontroller. An RFID tag is attached into the book with the relevant information like book name, book number etc. The detailed information regarding the book is also captured in the microcontroller. The book is issued to the student and a bookmark is stored in the EEPROM interfaced to microcontroller ,when the student returning from the library, bookmark check by the RFID reader and the controller checks whether the book details is valid or not if not valid then buzzer will buzz.



We can break the project into three parts like micro controller section, power supply section, and D.C. regulated power supply section. The Circuit shows the complete diagram of the RFID based book tracking system.

Micro controller section contains only micro controller 89C51 and a crystal of 11.0592 MHz for oscillator. As micro controller works on the program inside the memory. As a program generates the login therefore it does not require any logic circuits. As the controller keeps all the memory and I/O ports inside it, it contains very less components in its outer configuration. Power to the IC supplied is +5v DC.

In this RFID module was connected to microcontroller via RS232 (serial port) Then max232 was connected to the microcontroller as shown in the figure above 11, 12 pin are connected to the 10 and 11 pin of microcontroller, an LCD is interfaced with the microcontroller by connecting it to any of the port pins, LCD was used to display the information about which book has been issued.

3.2 ALGORITHM:**Step 1:** Start.**Step 2:** Enable Serial Port interrupt.**Step 3:** Initialize Lcd.**Step 4:** Initialize Serial Port.**Step 5:** Display "Show the card of the Item" on the Lcd.**Step 6:** Check whether Display button pressed or Card is shown to the reader.**Step 7:** If display button is pressed go to step-10**Step 8:** Else if RFID card is shown, go to step-12**Step 9:** Else go to 6.**Step 10:** Display the entries of EEPROM one by one on the Lcd, containing the Item IN and OUT details.**Step 11:** Go to step 6.**Step 12:** Read the card number**Step 13:** Read the date and time**Step 14:** Check if the card is already stored as "IN"**Step 15:** If the card is already stored as IN, make it as OUT with date and time.**Step 16:** Else store the card number along with date and time in EEPROM**Step 17:** Go to step 6.**Step 18:** Stop.**IV. Test And Result****V. Conclusion**

It is quite clear from the above discussion that an RFID system may be a comprehensive system that addresses both the security and materials tracking needs of a library. RFID in the library is not a threat if best practices guidelines followed religiously, that it speeds up book borrowing and inventories and frees staff to do more user-service tasks. The technology saves money too and quickly gives a return on investment.

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