



FPGA Based Library Management System

Manjiri Andhale, Vinaya Chamawar, Manaswini Hegde

E&TC Department, BVCOEW, Pune

Pune University, MH. , India

Abstract— This paper includes library management system which is used for maintaining a database of number of books to be issued and returned and recording the information of the authorized student. The purpose of this system proposed in this paper is also to identify the student identification by using RFID card. It is also used to check the status of each and every book by keeping a record of the books whether it is issued or not using RFID technology. Whenever student has to issue any book from the library, the student needs to insert RFID card into the RFID card reader placed in the library. The FPGA checks whether the student has got membership or not by communicating with RFID card reader. If the student has got the membership then the book can be issued to the student and in this way, student can update the information regularly while issuing and returning of books automatically. Along with this process GSM technology is also used in order to send message to the respective student regarding the due date of the book issued by the student and the fine applicable if the book is not returned on time. The system implemented also gives information to the student whether the book to be issued is available in the library or not. For this a database is prepared to keep the record of the books available in the library which will help in saving time of student and librarian.

Keywords— RFID READER, FPGA, GSM.

I. INTRODUCTION

Library management system is used to maintain the records related to number of books issued and the number of books returned to the library by the student, searching of books available in library, sending message to the student regarding the due date of book to be returned and fine applicable if the book is not returned on time by using the GSM technology and necessary requirements for the library to manage day to day operations taking place in the library. A library automation system is developed which will keep track of the books, whether they are issued or they are available in library, so that the student will get the instant information. The following are the tasks to be performed in the library which include handling user accounts and issuing/returning of the books. This system implemented maintains the information about any student and can also create, delete and update the record of the student as per requirement. The main purpose of the library management system is to maintain a proper discipline regarding the planning, managing and organizing the library tasks for making the task of library easy for librarian and the student. Library management relates with entering the records of new book and retrieving the details of book available in the library. We can issue book to the student and maintain their records and can also check how many books are issued and the number of books available in the library. In this project we can maintain the late fine of student who returns the issued book after the due date. The information related to book issue and book returns are maintained manually by the librarian along with maintaining the accounts of the students. All these process are automated in the library in order to avoid the manual errors taking place in the library and saving the time of both librarian and the student.

II. EXISTING SYSTEM

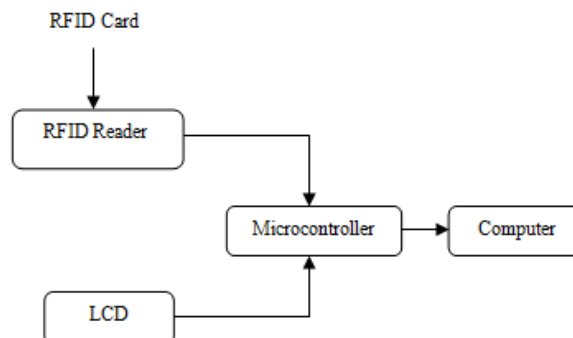


Fig. 1: Block diagram of existing system

- No high speed wireless communication with main unit.
- No security features.

- The existing system consists of microcontroller as a control unit. This system provides less flexibility on automation.
- More power consumption.

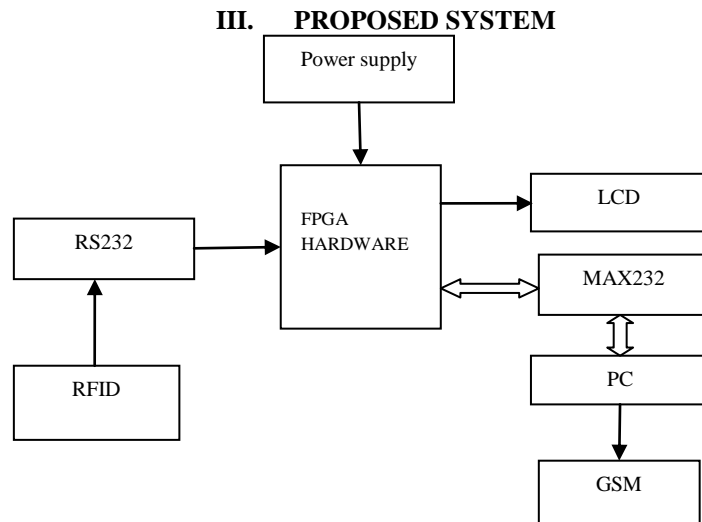


Fig. 2: Block diagram of proposed system

- RFID reader will be placed along with FPGA controller in library for identifying authentication of students.
- The entire system is developed as hardware based system using FPGA kit and associated devices.
- GSM technology is used to send message to the student one day before the returning of book issued.
- Maintains the database of the books available in the library and the details of students.

IV. BLOCK DIAGRAM DESCRIPTION

Block diagram of library management system consist of following blocks:

1) FPGA Hardware:

The Spartan-3 family of Field-Programmable Gate Arrays is used to interface with the PC which consumes less power and is reprogrammable accordingly.

2) LCD:

The LCD in the board is 16X2 characters display. Here, LCD is used for displaying the message 'card detected' when student places the RFID card on the card reader depending on the authentication of the student.

3) RS 232:

RS 232 is a serial communication cable used in this system. Here, the RS 232 provides the serial communication between the FPGA and the outside world such as display, PC or Mobile etc. So it is a media used to communicate between FPGA and the PC. Here RS232 serves the function to transfer the edited data from PC (VB software) to the FPGA for the further operation of the system.

4) GSM MODEM:

GSM (Global System for Mobile communication) is used for sending message to the student. With the help of GSM module interfaced, we can send short text messages to the required student regarding the due date of the book issued.

5) RFID Card Reader:

RFID reader is interfaced with the FPGA. RFID reader transmit the wireless signal at 125 KHz. Interfaced RFID reader continuously transmit the electromagnetic field across it. The range is max of 10cm. When the RFID card comes within this range, the RFID card gets powered up and provides data to the RFID reader.

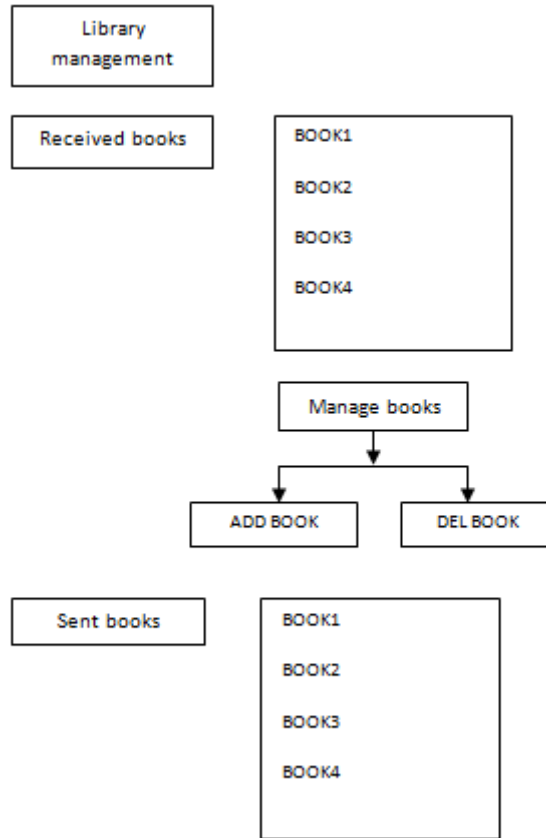
V. WORKING

In this section before the students enter the library for issuing or returning any book, the student has to place the library card on the RFID reader. The library card will be read by the RFID reader. Once the card is detected FPGA hardware will read the books ID and send it to PC. For displaying the details visual basic software is used which will accept these books and display in the following format.

Here the new books issued are stored on FPGA memory 232 when we press the send book button on VB software. Student can select at the maximum 4 books which can be selected from a database of books. The books selected by any student will be sent to issue book section from where the librarian will send the new updated books through FPGA hardware.

Format shown below represents the system format where user will be added after the RFID card is detected by the reader. Here, in this format add books option is provided where books needed to be added is selected from the list provided by the database. Total available books in the library are displayed in the first block of frame. Similarly in the second block of frame the number of books issued will be displayed. Along with this the books issued and the received books are maintained by the librarian.

A slot is provided for entering the user ID of the student which will be used for matching with the data read by the card reader when the RFID card was placed on the card reader by the student. Thus both the data will be matched with the database available with the librarian and further process will be performed accordingly by the librarian. Name of the student is entered in the provided slot and the data is saved. If any new data has to be entered then clear option is provided for clearing the previous data and entering new data by the librarians.



VI. RESULT AND DISCUSSION

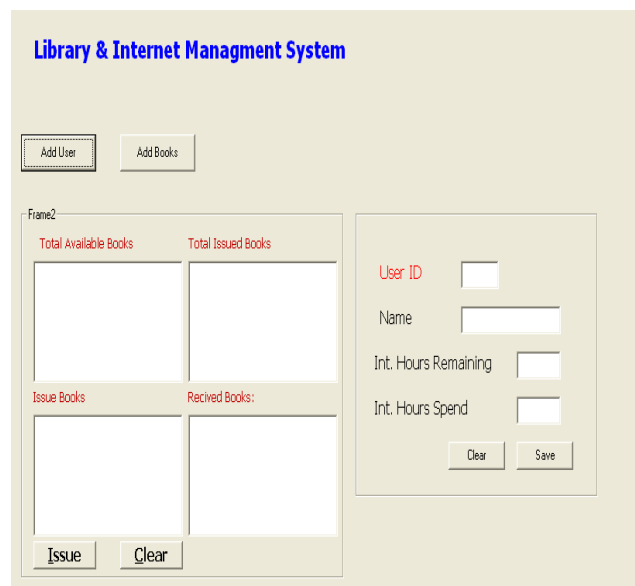


Fig. (a)

Using the above format the librarian can maintain the details of number of books available in the library. Along with this the librarian can enter the number of books issued and the books returned to the library.

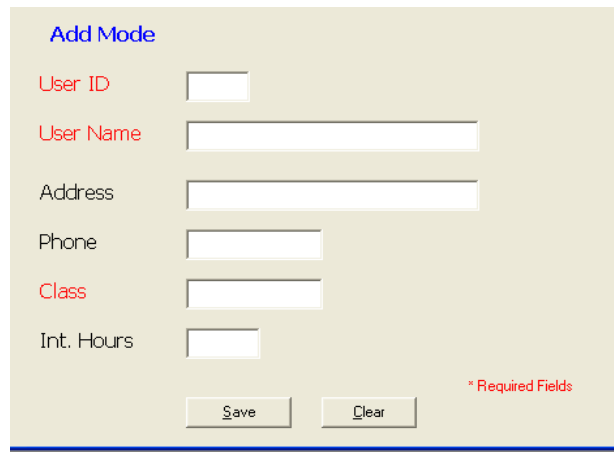


Fig. (b)

Using the above format the librarian can enter the details regarding the addition of database of a new student by entering the user ID and the details of respective student.

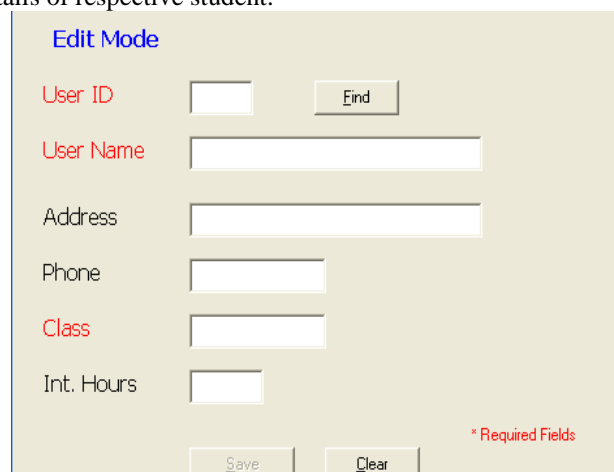


Fig. (c)

Using the above format the librarian can edit and update the information of the student accordingly as per required.

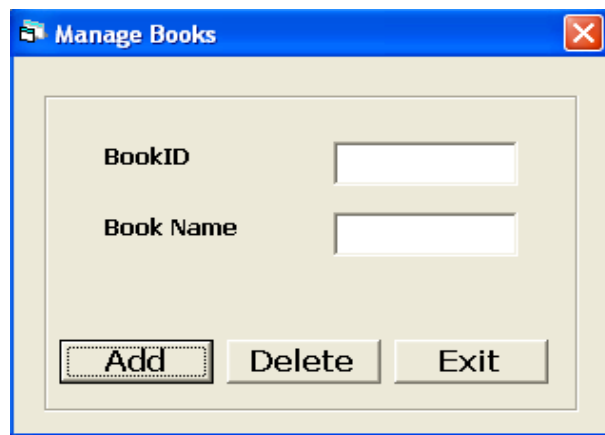


Fig. (d)

Using the above format the librarians can enter the book ID details and book name depending on the book available in the library.

VII. CONCLUSION

In this paper we have presented an automated library management system using FPGA. Here RFID cards are used for each user so that the user will be authorized and time consumed by the user and the librarian will be reduced to some extent. A GSM modem is used for sending message to the user regarding the last due date of returning the book and the fine to be paid if the book is not returned before the due date. The system will help to reduce the waiting time of users in queue for issuing and returning of books in the library.

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