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RFID Based Intelligent Book Finder Using Ultra High Frequency Sensor

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ABSTRACT: Locating items rapidly and accurately has become a crucial part of our modern library. Accurate locating not only saves time and money but also reduces waste, as products do not get lost along supply chains. One promising indoor tracking method is provided by radio-frequency identification (RFID) technology. The main benefit of RFID technology is the ability to inventory items simultaneously and rapidly without the requirement of line of sight to the target. Because RFID tags are attached to various objects and are used in different environments, RFID engineers are required to design RFID tags that operate reliably within varying environments and medium materials. In this approach, the books are equipped with an ultrahigh frequency (UHF) RFID tag and can be located using a hand-held RFID reader device. In addition to locating the books, the system keeps the book inventory up to date.

KEYWORDS: RFID, Library Management System, Proteus Design Suite.

I. INTRODUCTION

RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. RFID is a general term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object wirelessly, using radio waves. This is sometimes referred to as contact-less technology and a typical RFID system is made up of three components: tags, readers and the host computer system.

An RFID tag is a tiny radio device that is also referred to as a transponder, smart tag, smart label or radio barcode. The tag comprises of a simple silicon microchip attached to a small flat aerial and mounted on a substrate. The whole device can then be encapsulated in different materials (such as plastic) dependent upon its intended usage.

The RFID tags are embedded into the books and are not visible for detection. The readers since they have a wide read range unlike bar code readers have the capability to read the tags even when they are embedded within the books. Special care and attention should be given in programming the tags since they are mostly programmable only once. These tags can store book name, author information, publication name and etc., but the bar code technology is limited to only the identification number. The programming cost of RFID tags are much costlier than the barcodes but it should be noted that the same tag can be reprogrammed if necessary. Depending on the applications added the cost of tag increases.

In principle an RFID tag works as follows: the reading unit generates an electro-magnetic field which induces a current into the tag's antenna. The current is used to power the chip. In passive tags the current also charges a condenser which assures uninterrupted power for the chip. In active tags a battery replaces the condenser. The difference between active and passive tags is explained shortly. Once activated the tag receives commands from the reading unit and replies by sending its serial number or the requested information. In general, the tag does not have enough energy to create its own electro-magnetic field, instead it uses back scattering to modulate (reflect/absorb) the field sent by the reading unit. Because most fluids absorb electromagnetic fields and most metal reflect those fields the reading of tags in presence of those materials is complicated.

During a reading cycle, the reader has to continuously power the tag. The created field is called continuous wave, and because the strength of the field decreases with the square of the distance the readers have to use a rather large power. That field overpowers any response a tag could give, so therefore tags reply on side-channels which are located directly below and above the frequency of the continuous wave.



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II. RELATED WORK

The paper [1] presents Event-driven architecture not only shares many of the same characteristics with service-oriented architecture, such as modularity, loose-couplings, and adaptability, but also has ability to process event in an asynchronous way. So it is able to respond better to real-time changes and Integrate the system. This article is concentrate on RIFD information management system design which base on EDA/SOA. The paper [2] proposes RFID provides a good wireless platform to facilitate indoor positioning. However, duo to the small width of each book spine, adopting positioning based RFID alone is not enough to locate books in a library. In this work, they combine image matching with L-GEM based RBFNN to enhance the accuracy and robustness of the book locating system. We apply this new method in a library to position the certain books. Experimental results show that the proposed method is highly accurate and robust to white noise of RFID signals. The paper [3] presents a RFID Intelligent Book Conveyor using Radio Frequency Identification (RFID) technology and embedded technology, they also exploited GUI using Qt integrated development environment. This book conveyor is a portable equipment with complete functions, friendly interface and convenient operation. It can greatly improve the work efficiency of librarians and the service quality of the library. The paper [4] proposes a smart Book-LOCating System called BLOCS with two location modes using RFID technology – single book mode and book list mode. The single book mode provides users to find the bookshelf containing the desired book which was misplaced. The book list mode offers a corresponding list of the bookshelves and the misplaced books regularly for a librarian to localize all misplaced books in the wrong bookshelves. The simulation results show that the locating accuracies of the single book mode and the book list mode. The paper [5] presents a 3D RFID-based library search System. Measuring and determining RFID-tagged book location is an application development for the library search system namely 3D RFID-based library search system. This paper presents the development of this application which includes the application execution flow and as well as the laboratory scale system structure.

A. EXISTING SYSTEM

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. 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 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). This system only detects the missing books. It does not give any student information. It only provides the easy maintenance of the books in library. It will not give the due date information.

III. PROPOSED SYSTEM

RFID is an automatic identification technique used for the fast transaction of books, journals or DVDs using RFID tags and readers. The RFID technology helps in fast issuing, returning, and reissuing of books. The technology helps in direct transaction of information from the tags to the PC of the librarian and in automatic updating of transactions in the users account.

The RFID tags can be programmed unique code. This code gets read when passing through the RFID reader. When a tag crosses the reader the reader recognizes the unique code and updates the account of the user. The RFID tags are embedded into the books and are not visible for detection. The readers since they have a wide read range unlike bar code readers have the capability to read the tags even when they are embedded within the books.

Special care and attention should be given in programming the tags since they are mostly programmable only once. These tags can store stack number, accession number, book number, author information etc., but the bar code technology is limited to only the identification number.

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A. BLOCK DIAGRAM

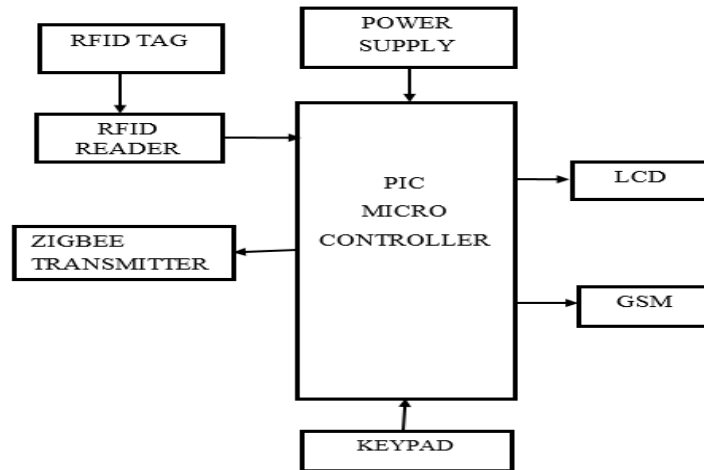


Figure 1: Block diagram of the system

Figure 1 shows the block diagram of the system. The system is based on RFID readers and passive RFID tags that are able to electronically store information that can be read with the help of the RFID reader. This system would be able to issue and return books via RFID tags and also calculates the corresponding fine associated with the time period of the absence of the book from the library database. GSM technology is used in the proposed system in order to alert the user with the books taken, due date for return and the fine to be paid if not returned on time.

B. SYSTEM DESCRIPTION

To implement Library Management System (LMS) designs, a platform has been selected which includes the Software: Embedded C, PIC C Compiler, Proteus design suite and Hardware: PIC Microcontroller and power supply, LCD, RFID TAG, RFID Reader, GSM, ZigBee.

C. PROTEUS DESIGN SUITE

The Proteus Design Suite is an Electronic Design Automation (EDA) tool including schematic capture, simulation and PCB Layout modules. It can be purchased in many configurations, depending on the size of designs being produced and the requirements for microcontroller simulation.

Schematic capture in the Proteus Design Suite is used for both the simulation of designs and as the design phase of a PCB layout project. It is therefore a core component and is included with all product configurations. The micro-controller simulation in Proteus works by applying either a hex file or a debug file to the microcontroller part on the schematic.

Proteus is composed of two applications called ARES and ISIS. ISIS is mainly focused on the design of a real circuit board and how it works with the different elements that a PCB has. For example, it allows you to simulate microcontrollers and its different connections in real time.

On the other hand, ARES is able to route and place the different objects and is used to generate printed circuit boards. Besides that, one of the good things about this program is that it is very versatile and is able to effectively integrate all the parts of the project. Proteus incorporates a common database which allows the user to automatically update the data of the different modules which are part of the main project. In addition, the 3D viewer has been improved and lets you see changes and modifications in real time.

Virtual Terminal is a tool in Proteus, which is used to view data coming from Serial Port (DB9) and also used to send the data to Serial Port. In windows XP, there's a built in tool named Hyper Terminal, which is also used for the same purpose but in windows 7 there's no such tool so for windows 7 users this virtual terminal is quite a great comfort.

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Virtual Terminal in Proteus is used to send or receive data to or from the serial port. Serial port is a 9 pin port which is mostly find on the computer.

IV.RESULTS & DISCUSSION

I. SOFTWARE IMPLEMENTATION

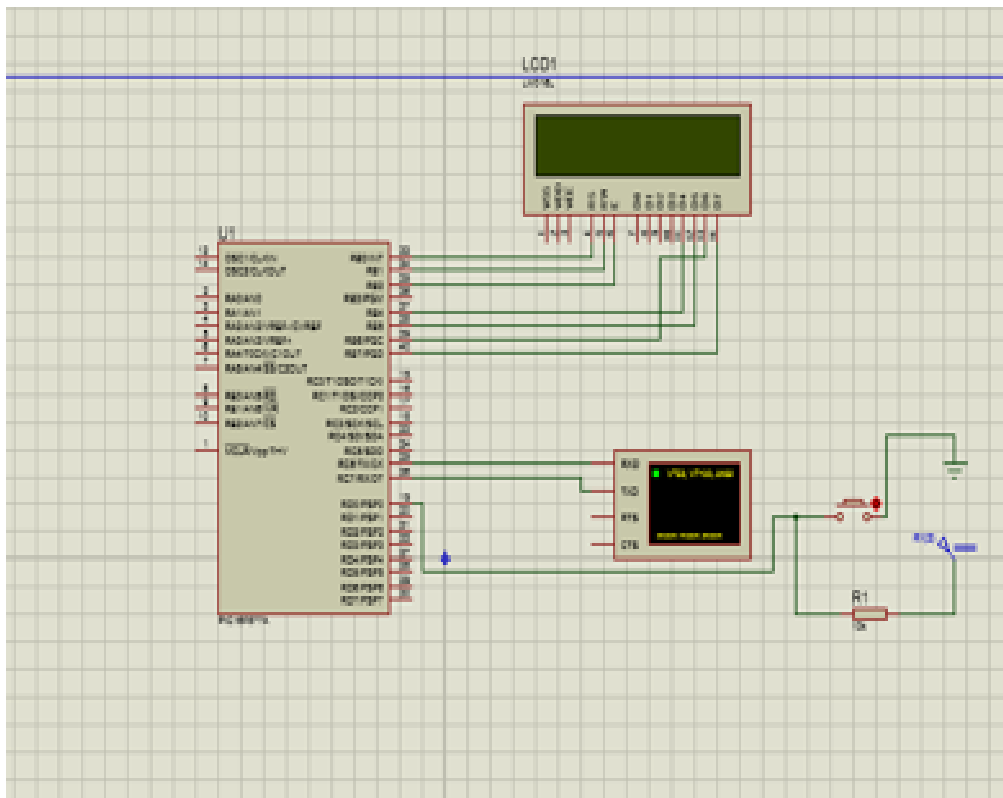


Figure 2: Software implementation of the System

Figure 2 shows the Software Implementation System. The Schematic capture of the System is implemented in Proteus Design Suite software. When enter the tag no of the student, the details of the student book will be shown in the virtual terminal of the Proteus Design Suite software. Then enter the tag no of the student, the details of the book will be shown in the virtual terminal of the Proteus Design Suite software. After few days the student press the switch within the due date, the book will be returned. If the student does not press the switch within the due date, the 2 days remaining message will be displayed. After 2 days the date over message will be displayed.

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II. HARDWARE IMPLEMENTATION

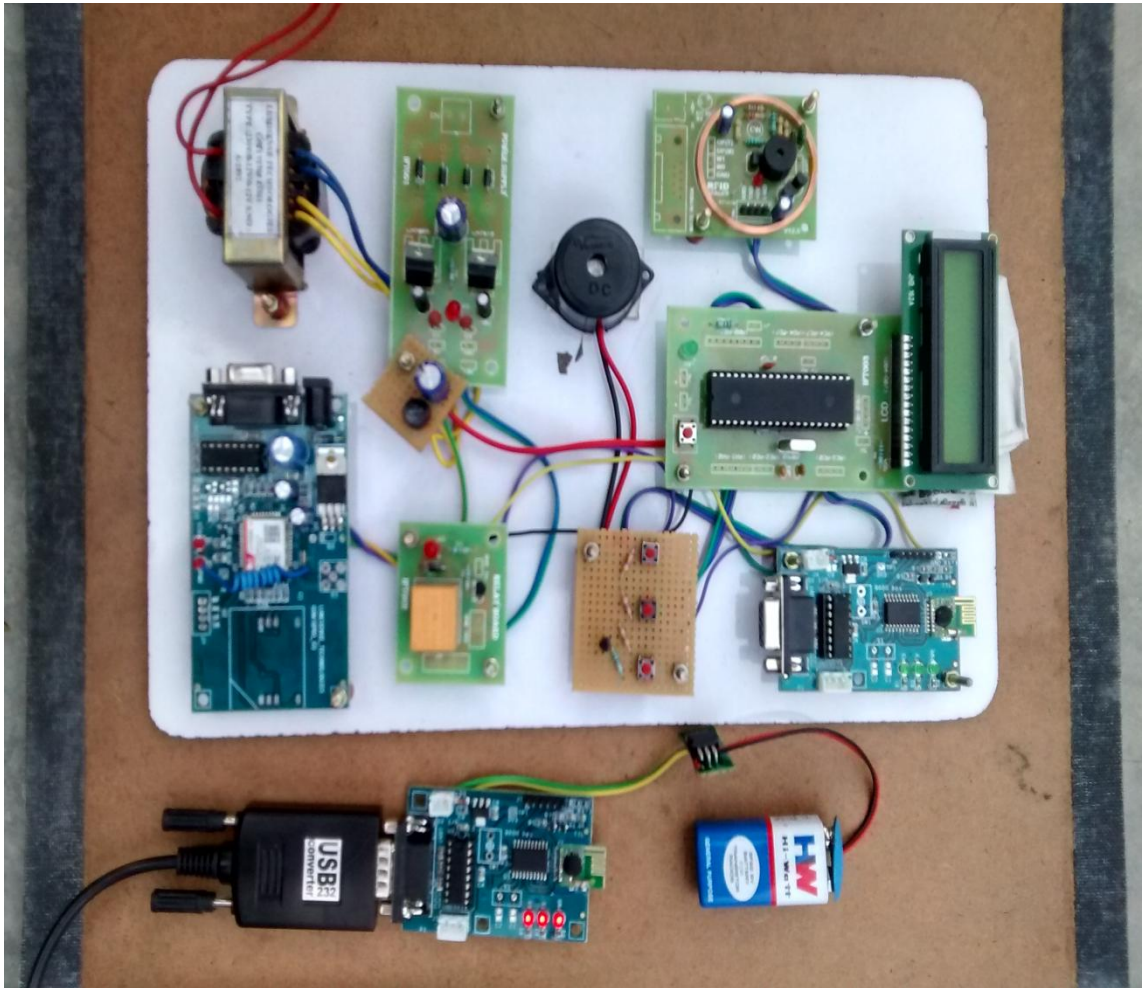


Figure 3: Hardware implementation of the system

Figure 3 shows the hardware implementation of the system. By using this hardware implementation, the location of the book in the library will be found and the book issue and return process will be performed.

When the student takes and returns the book, the following steps are performed.

1. When student selects the required book name, the location of the book will be displayed. Then the student takes the book from that location.
2. The Student RFID tag is shown in front of the RFID Reader. The RFID Reader read the student tag, then display the student details will be displayed.
3. The Book RFID tag is shown in front of the RFID Reader. The RFID Reader read the book tag, then display the book details will be displayed. Then the book will be added to the student database.
4. The SMS will be sent to the student in order to alert the student with the book taken and due date for return.
5. When the student shows the book tag in front of the RFID Reader within the due date, the book will be returned.
6. The SMS will be sent to the student in order to alert the student with the book return.

SMS ALERT TO THE STUDENT – BOOK RETURNED WITHIN THE DUE DATE



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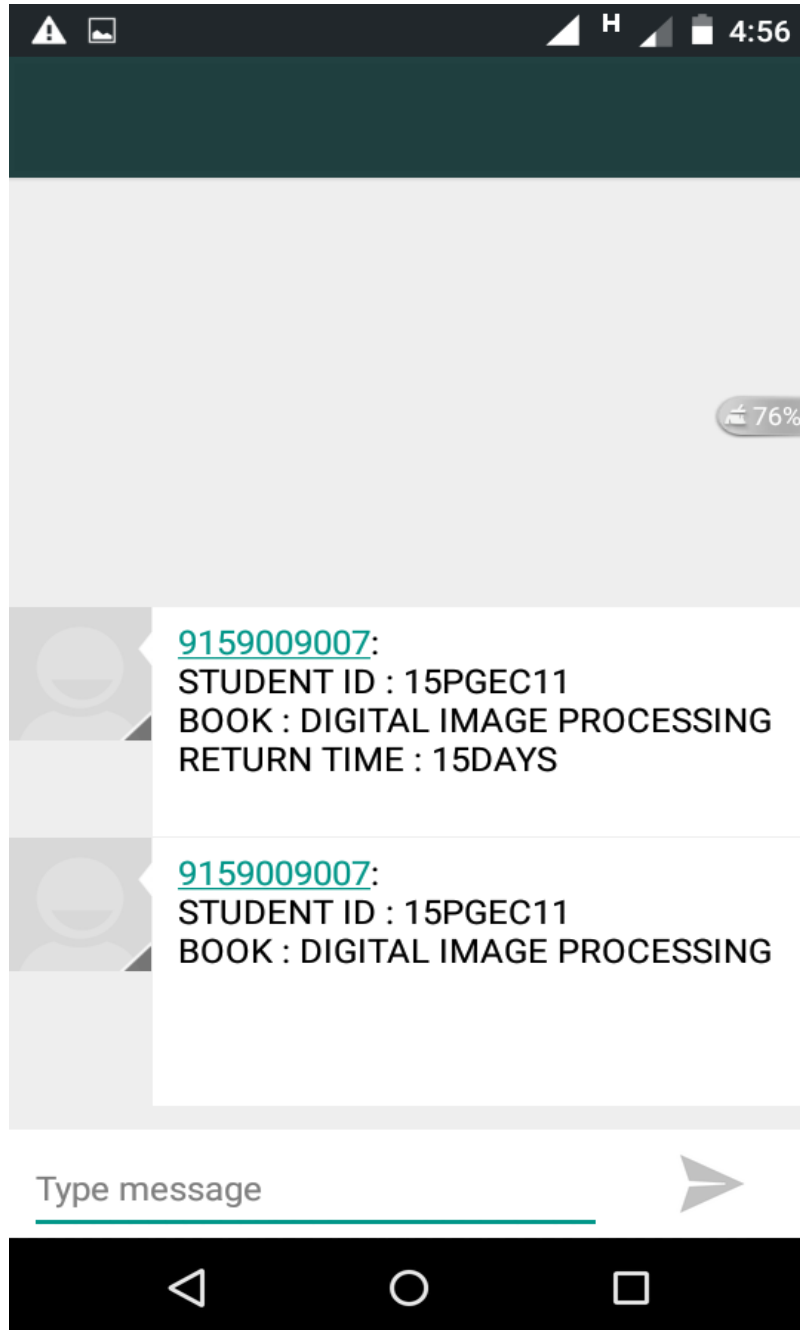


Figure 4: SMS Alert to the student – Book returned within the due date

Figure 4 shows the snapshot of the SMS Alert to the student. This SMS Alert is sent to the student if the student returns the book within the due date.

7. If the student does not return the book within the due date, the warning alert will be sent to the student.
8. If the student does not return the book after the warning alert, the alert will be sent to the student that contains the time is over for returning the book.



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9. If the student returns the book after the due date, the fine amount will be calculated depends upon the extra days from the due date and the alert will be sent to the student.

SMS ALERT TO THE STUDENT – BOOK RETURNED AFTER THE DUE DATE

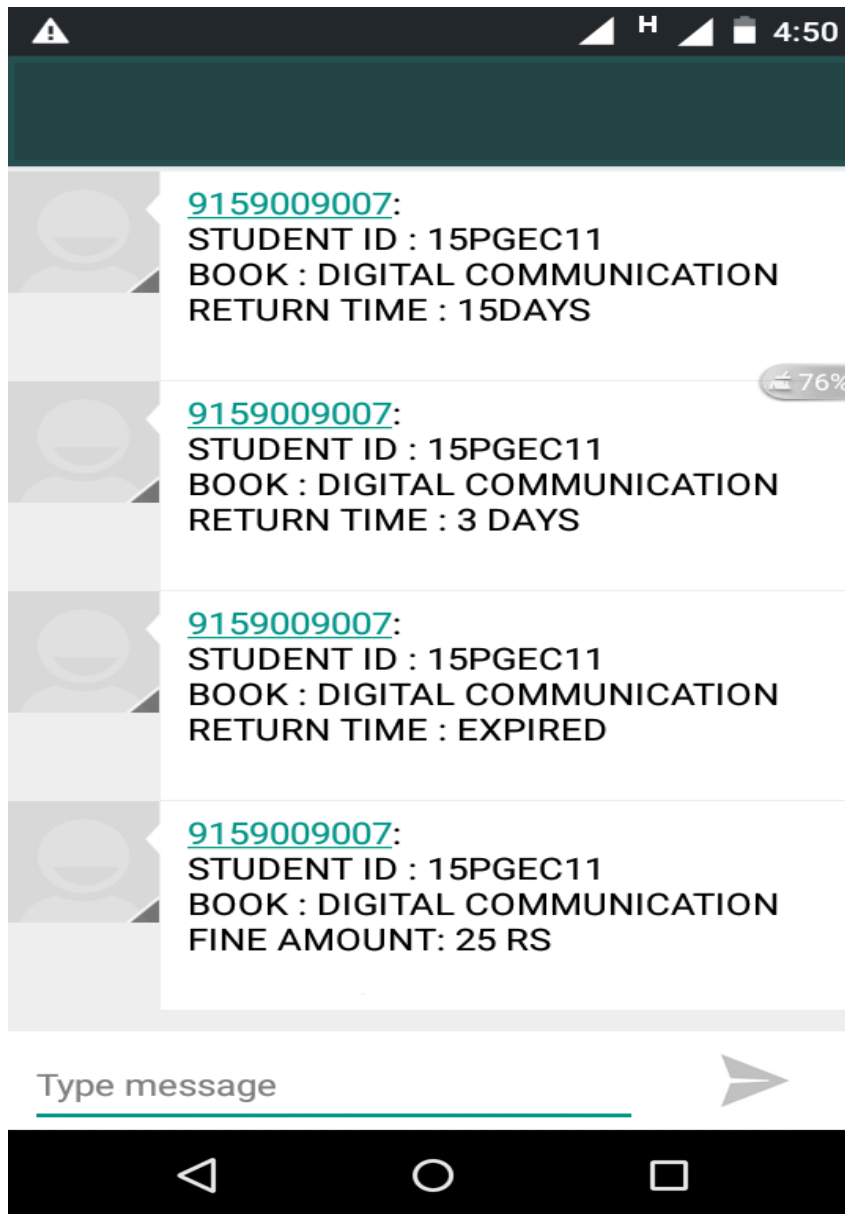


Figure 5: SMS Alert to the student – Book returned after the due date

Figure 5 shows the snapshot of the SMS Alert to the student. This SMS Alert is sent to the student if the student returns the book after the due date.



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V. CONCLUSION AND FUTURE WORK

A. CONCLUSION

RFID in the library speeds up book borrowing, monitoring, books searching processes and thus frees staff to do more user-service tasks. These applications can lead to significant savings in labour costs, enhance customer service, lower book theft and provide a constant record update of new collections of books. The system that would allow fast Transaction flow and will make it easy to handle the issue and return of books from the library without much intervention of manual bookkeeping which benefits by adding properties of traceability and security.

B. FUTURE WORK

By using HF readers we can track the books and hence find the misplaced books. By placing RF sensors at the exit gateways theft detection is possible. The alarm will ring if a person is carrying away a book that is not in the barrowed list. You can even implement auto borrow and return of the books which eliminate the need of staff at these two sections.

REFERENCES

1. A. Ankit Kumar Jain, T. Rama Krishna, "Dynamic Book Search Using RFID Technology", Volume 2, Issue 6, October-November, 2014, ISSN 2091-2730, Page no:138-142.
2. Terence Jerome Daim, RazakMohd Ali Lee, "3D RFID-Based Library Search System Application Development", 978-1-4244-8648-9/10/\$26.00 ©2010 IEEE, Page no:107-111.
3. Wing W. Y. NG, Yi-Song Qiao, Li Lin, Hai-Lan Ding, Patrick P. K. Chan, Daniel S. Yeung, "Intelligent book positioning for library using RFID and book spine matching" 978-1-4577-0308-9/11/\$26.00 ©2011 IEEE, Page no:465-470.
4. Wu Jieming, Ding Yu, "A Study on RFID Book Information Management System with an EDA/SOA", vol. 02, pp no.451-455, 2009, doi:10.1109/ISECS.2009.157, Page no:451-455.
5. Zhu Chang-ping, Wang Zh, Deng Jing-xuan, Gu Hui, Shan Ming-lei, HanQing-bang, Yu Hong-zhen, Zhang Shen, "Design of an Intelligent Book Conveyor Based on RFID", 978-1-4244- 7618-3 /10/\$26.00 ©2010 IEEE, Page no:1-4.
6. Dhanalakshmi M, UppalaMamatha, "RFID Based Library Management System", 2009, Page no:223-230.
7. Dr.Prabhat Pandey, Ms. K.D. Mahajan, "Application of RFID Technology in Libraries and Role of Librarian", Page no:1-7.
8. Kuen-Liang Sue, Yi-Min Lo, "BLOCS: A Smart Book-Locating System Based on RFID in Libraries",1-4244-0885-7/07/\$20.00 2007 IEEE, Page no:1-6.
9. Narayanan A., Sanjay Singh and Somasekharan. M, "Implementing RFID in Library: Methodologies, Advantages and Disadvantages", Page no:271-281.
10. PritiPawar, KavitaShegaonkar, ArchanaUdane, "Radio Frequency Identification Based Library Management System", March 2016, ISSN NO - 2394-3696, Page no:1-6.
11. Priyanka Grover and Anshul Ahuja, "Radio Frequency Identification Based Library Management System", Vol.1, July 2010, Page no:41-45.
12. S.Parameshwara, B. Anusha, M. R. Chandrika, J. Pavithra, RakshaMuralidharkodangal, "RFID for Library Management", Volume-2, Issue-1, January 2016, ISSN: 2395-3470, Page no:354-357.
13. S. Vimalraj, S. Sameera, S. Saranya, "RFID based Library Management System", ISSN: 2349-2163 Issue 1, Volume 2 (January 2015), Page no:326-329.
14. Sree Lakshmi Addepalli, SreeGowriAddepalli, "Library Management SystemUsing RFID Technology", Vol. 5 (6), 2014, Page no:6932-6935.
15. Suganthy. R, "RFID Library Management System", Vol.4 (Iss.5: SE): May, 2016, Page no:87-91.