

RFID Based Component Tracking System

Shubham Jain¹ Rahul Jagtap² Mayuri Lonare³ Yugandhar Sonawane⁴

^{1,2,3,4}Department of Computer Engineering

^{1,2,3,4}MET's Institute of Engineering, Nashik, India

Abstract— A proposed system which is used for industrial purpose for help and comfort provides Automation, efficiency and convenience in everyday life. A training program is organized for the students to gain some practical knowledge about the work. The company has a rich set of components which are used by the students for the practical activities. Keeping track on these components becomes problematic. So it may happen that the components could be misplaced by the students. For this purpose we are using various types of technologies like RFID (Radio-frequency Identification) based on Tracking Component system which is developed for providing automation to withdraw the components and keep track on them. In this system we can maintain login session for authorized person. Those are tracked by using bar code, QR code RFID tags. The components are tracked when they get in range of RFID Reader to scan the bar code, QR code, RFID tags. When a person withdraws the components, the system maintains a record of them. If any student fails to return the component, it goes under the pending state. If any component illegally crossed exit doors then system alarm generation happens and also displays shortage of components warning, quantity of available components and required components is to be displayed.

Key words: Automation, RFID (Radio-Frequency Identification), QR Code, Bar Code, RFID Tags, Alarm Generation

I. INTRODUCTION

A. Radio-Frequency Identification

Radio-Frequency Identification is the wireless use of electromagnetic fields to automatically identify components and track components with the help of attached tag in the laboratories or inventory stores etc. RFID offers advantages over manual systems or use of bar codes and QR codes. If component attached through tag passed near a RFID reader even if it is covered by the object or not visible, the RFID tag can be read. The RFID tag can be read inside a human body, box, wallet or other containers. RFID tags can be read hundreds at a time.

RFID used for component level tagging in stores and laboratories. In addition to inventory control, this provides both protection against theft by customers or students (in laboratories) and employees by using Electronic Article Surveillance (EAS) and self-check out process for customers. On leaving the Lab students have to pass near an RFID detector, if they have component attached with RFID tags, an alarm sounds, both indicating a student attempt against theft protection, and identifying what component it is.

II. LITERATURE SURVEY

A. Smart Shopping Trolley

A shopping mall uses the concept of Smart shopping trolley using RFID. Among the difficulties faced by customers is to

follow queue to paid billing amount. The main aim of this concept is to satisfy the customer and to reduce the time spent to pay the billing amount in the trolley rather than waiting in a queue. The customers have to add product in trolley and the finalized amount will be display in the trolley.

B. Library management system

RFID based library management system that manages and stores book information electronically. This system allow fast transaction flow and will easy for librarian to handle the issue and return of books from the library without much use of manual register keeping. The system would be able to maintain the issue and return books by students via RFID tags and also compute the corresponding fine for the time period of the absence of the book from the library database.

III. PROPOSED SYSTEM

The concept which we are going to implement will provide automation in tracking components with the help of RFID technology and other sensors. This system will reduce the workload of the System Administrator, except the manual work such as looking after the main server which will be done by Lab Assistant. At the time of registration, system will assign unique ids to all the students, components and Staff Members. Staff member will register their information and maintain the digital records such as students and staff data, report and quantity of the components. System will provide a security to the Lab. It generates an alarm for the components which crossed the exit point of the Lab.

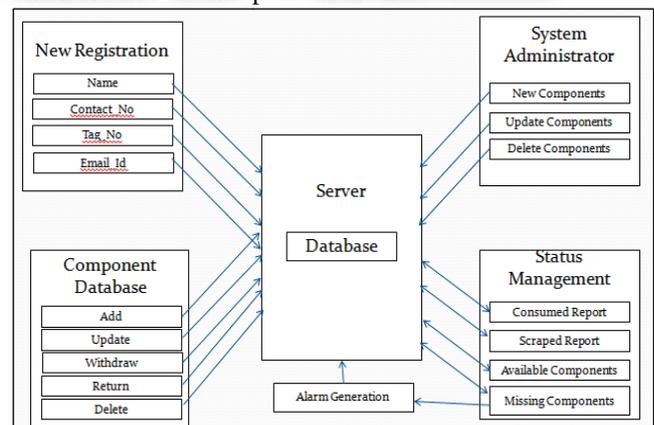


Fig. 1: Architecture Diagram of the RFID based Component tracking system

The figure shows the system architecture of the Sensor based Component Tracking System. A System Architecture is the overall representation of the system. This representation covers the 4 major phases of the system, new registration, Component database, System administrator, status management.

New registration phase deals with the task of registering a new student, it takes the student details such as name, contact no, tag no, email-id.

System Administrator phase describes the task of the administrator such as to include new components, updating the database of the components, to delete the component from the database.

In Status Management phase includes all type of report generations such as Consumed component by the users. Scraped Components in the Laboratory, count of available components in the laboratory which also help us to order the components when required and missing report contain the information which is not in the consumed and scraped component list.

This phase elaborates the operations clone on the database such as adding new items, updating of the database issuing some components from their database, their having deletion of old element and also return the withdraw components.

A. Advantages

- Provide high level security to components
- Generate an alarm for those components which illegally crossed the exit door.
- Easy to use.
- It saves time.
- Quantity of available components is also maintained.

B. Applications

- The proposed system can be used at different training centers to provide security.

IV. MATHEMATICAL MODEL

Let S be the system for implementation of Sensor based component tracking

$$S = \{s, e, I, F, O, DD, NDD\}$$

Where,

s = Initial state – Student and Staff registration for entering into lab.

e= End state – Detect the components using different RFID readers and also maintain records.

I = Input given by user

F is a set of function

F = {F1, E2, F3, F4, F5, F6, F7, F8, F9, F10}

F1 = Registration of student, administrator or shopkeeper

F2 = Login of Administrator and shopkeeper

F3 = Add components by administrator

F4 = Update components by administrator

F5 = Remove components by administrator

F6 = Display list of available components

F7 = Display list of consumed components

F8 = Display list of scrapped components

F9 = Display list of missing components

F10 = Maintain attendance of students

O = Output generated after applying method (i.e. report generations such as Consumed component by the users. Scraped Components in the Laboratory, count of available components in the laboratory and missing components).

V. CONCLUSION & FUTURE WORK

After analyzing, we can conclude that the system which we are going to implement will lead to automation in tracking the components present at the Training Center. The system will

also maintain a digital record such as timely report for all categories of components. Thus, it will result in the reduction of workload of the Administrator.

REFERENCES

- [1] Amritha Balachandran, Bharti Chauhan, Umesh Chauhan, Ashish Bokare : “ERP SYSTEM FOR COLLEGE AUTOMATION USING RFID TAGS “. Multidisciplinary Journal of Research in Engineering and Technology, Volume 2, Issue 2
- [2] Komal Machhirke, Priyanka Goche, Rupali Rathod : “A New Technology of Smart Shopping Cart using RFID and ZIGBEE”. International Journal on Recent and Innovation Trends in Computing and Communication Volume: 5 Issue: 2
- [3] Dr. Annaraman, P. Thamarai, Dr. T.V.U. Kiran Kumar : “Smart Library Management System using RFID”. International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 4, Issue 4, April 2015
- [4] Y. J. Zuo "Survivable RFID systems: Issues, challenges, and techniques", IEEE Trans. Syst., Man, Cybern. C, Appl. Rev., vol. 40, no. 4, pp.406 -418 2010
- [5] S. S. Saad and Z. S. Nakad "A standalone RFID indoor positioning system using passive tags", IEEE Trans. Ind. Electron., vol. 58, no. 5, pp.1961 -1970 2011
- [6] Steve Lewis, “A Basic introduction to RFID Technology and its use in the supply Chain”, Jan 2004.