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Inventory Management System for Warehouse

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Abstract - *A proposed Inventory Management system which is used in industry providing automation, efficiency and convenience in everyday life. An enterprise has a variety of components which are used by the employees for the routine activities. Keeping track of these components becomes problematic wherein the components might go missing at the hands of employees. To remedy this, various types of technologies like Bar-code Scanner or RFID (Radio-frequency Identification) based on Tracking Component system is developed for providing automation, withdrawing the components and keeping better track of them. In this system we can maintain login session for authorized person which are tracked by using RFID tags. The components are tracked when they get in range of RFID Reader to scan RFID tags. When a person withdraws the components, the system maintains a record of them. If any employee fails to return the component, it goes under the pending state. If any component illegally crossed exit doors then system generates an alarm and also displays shortage of component warning, quantity of available components and required components is to be displayed enabling automated inventory management with minimal manual intervention. We are also incorporating machine learning which will help us understand the product ratings i.e. which products are used more etc. Using machine learning with RFID tags will make the system more efficient and profitable as it will generate demand of the products on its own. The data will be stored on the cloud which will make it accessible from anywhere remotely. The data can also be viewed on mobile using cloud.*

***Key Words*: Automation, RFID (Radio-Frequency Identification), Alarm generation, Machine Learning, Cloud Computing, Mobile Computing.**

1. INTRODUCTION

The world is emerging into digitization and every sector is getting digitized with software solutions. Every industry is looking smart solution to get into digital way. Digitization gives many advantages like data can be accessed anywhere, any information or record can be found within time, and most important is less paper work as everything goes on server database. This paper gives idea how an inventory management system can be helpful to reduce manual efforts and bring the productivity of any industry though it is small or big. Inventory management system (IMS) keeps track of all records seamlessly. Products can be categorized with quantity can be managed easily with real time data availability. System generated reports can be downloaded and process can be improvised according to report analysis. Efficiency of worker can be increased with the help of IMS. All the respective departments can be involved in system and use role based IMS. Project Idea Register the student/supervisor by using bar-code and detailed information of student and supervisor. This system is used to track the component and reduce the manual work of lab-assistant. The feature of this system is to keep the record of component and stock of component using bar-code. The system with user friendly GUI which is understand by all normal users of the system. Any normal user uses this system and register itself with the help of supervisor. Thus our project paper will be organized into steps such as:

1. Literature Survey which will explain the existing works and their limitations.
2. Proposed System which will explain the steps to achieve a successful implementation.
3. Conclusion which will explain the overall achievement of the project.
4. References which will list the papers that are to be referred.

2. LITERATURE SURVEY

Smart Shopping Cart Ever since the debut of wireless technology, electronic commerce has developed to such an extent to provide convenience, comfort, and efficiency in day-to-day life. The main purpose of this paper is to provide centralized and automated billing system using RFID and ZigBee communication Each product of shopping mall, super markets will be supplied with an RFID tag, to identify its type. Every cart contains PID (Product Identification Device). Specifically, PID contains a microcontroller, LCD, an RFID reader, EEPROM, and ZigBee module. There will also be a centralized database from which we can give product recommendation to the customer [3].

Library Management System: A library is a collection of information, sources, resources, books, services and the structure in which it is housed. Apart from books many libraries are also repositories and access points for maps, prints or other documents on various storage media such as microform (microfilm/microfiche), audio tapes, CDs, LPs, cassettes, videotapes, and DVDs. RFID is a technology which improves the tracking of books and documents, significantly reduces management costs and increases the time that librarians spend with patrons by enabling automated book handling at check-ins, checkouts, collections

inventories, book sorting and theft deterrence. RFID plays vital role in redefining the library process, increases efficiency, productivity and enhances user satisfaction [4].

Storage Management System: This paper proposes a digital warehouse management system (DWMS) in the tobacco industry based on radio frequency identification (RFID) technology. The DWMS helps warehouse managers to achieve better inventory control, as well as to improve the operation efficiency. In this system, a set of basic events and storage/retrieval rules are defined as event-condition action (ECA) rules to improve the feasibility and flexibility DWMS. By using RFID technology, the DWMS enables a plane warehouse to achieve visualized inventory management, automatic storage/retrieval assignment and high accuracy of inventory control as an automatic warehouse. A case in the tobacco industry is studied to illustrate the feasibility and rationality of the proposed system. Based on the ECA rules, a storage/retrieval methodology is proposed to improve the storage/retrieval operations. The results of this case study illustrate that RFID-DWMS can help a plane warehouse to improve operation efficiency, enhance the utilization of warehouse capacity, increase inventory accuracy and reduce manpower and loading time significantly [10].

3. PROPOSED SYSTEM

In Component tracking system we are going to do an inventory management system of a lab where the components will have a RFID tag. The data of the component then can be saved to cloud. A RFID monitor having a scanner will be on which will detect the in and out stock of the component and also find out the theft of the component by seeding alert which the admin can view on his mobile.

3.1 Goal and Objectives

1. To Secure Lab Components from Theft.
2. To maintain inventory of a lab.
3. To use Machine Learning.
4. To use Cloud Computing.
5. To use Mobile Computing.

3.2 Statement of Scope

There are few scopes of the system to achieve successful Inventory Management System:

1. *RFID handler:* The System will first assign RFID tags to component and users and then maintain in stock and out stock on the cloud.
2. *Cloud Computing*: The System will use Google Drive and Google Spreadsheet as the cloud.
3. *Machine Learning:* The system will use SVM (Support Vector Machine) algorithm for grading the products of much use.
4. *Mobile Computing:* The system can view the data on the mobile from cloud.

4. SYSTEM ARCHITECTURE

4.1 System Architecture

1) Upload and View Data: In the screenshot a communication with the cloud is made and the data can be uploaded and downloaded using the application.

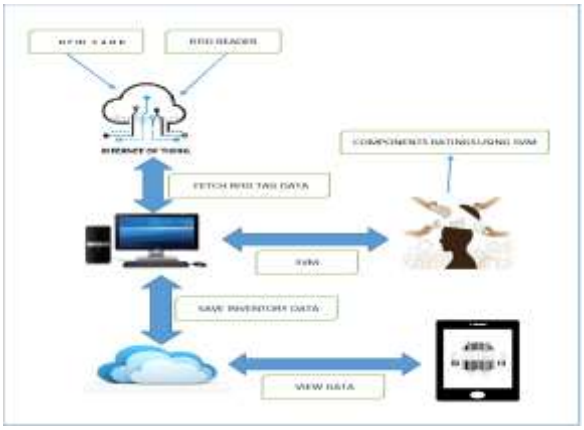

Fig-1: System Architecture

4.2 Details

1. *Internet of Things:* In this module a Arduino Uno will be used with RFID reader to read the RFID tags and send the data to the assigned desktop using Wi-Fi and ESP 8266.
2. *Desktop:* In this module the desktop will receive the data from IoT and save data to cloud for further processing. It will also have a RFID monitor which will continuously monitor new RFID tags and thus help in maintaining the in stock and out stock of the components. It will also detect the component theft and send the alert with data to the cloud.
3. *Cloud:* This module will store the data using Google Drive and Google Spreadsheet API.
4. *SVM:* This module will rate components so that the user will understand which products are used more.
5. *Mobile:* This module will view the data on an Android phone and view alerts using an Mobile App.

5. ALGORITHM

1. Start
2. Initialize IoT
3. Read RFID tag
4. Send Readings to Desktop
   if(sendsuccess==0)

then
-Return to Step 3.
else
-Save RFID
-Continue

5. Start Monitor
   -Maintain Out Stock
   -Maintain In Stock
   -Detect Theft
   if(theftdetect==1)
   then
   -Send Alert
   else
   -Continue
6. Generate Training Dataset
   -Enter readings for Good Class.
   -Enter readings for Better Class.
   -Enter readings for Best Class.
   - Create Training dataset.
7. Apply SVM
   -Read Training Dataset
   -Read Component data
   -Generate Testing Dataset
   -Apply SVM
   if(Pre>Pre1)
   then
   -Data Good
   else if(Pre<Pre1)
   -Data Better
   else
   -Data Best
   -View Results
8. View Alert
   -Login in Mobile App.
   -View Theft data
9. Close

6. RESULT ANALYSIS AND DISCUSSION

6.1 Results for Hardware connection and system for adding out stock details

- **1)**Arduino Uno Connected to RC522 and ESP8266 NodeMCU. And swap RFID cards two times first for user and second for item and the data automatically fetched only if Add Button is pressed.

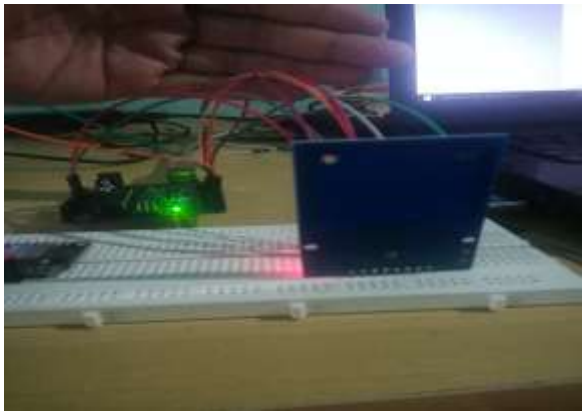

Fig-2 : Hardware Connection

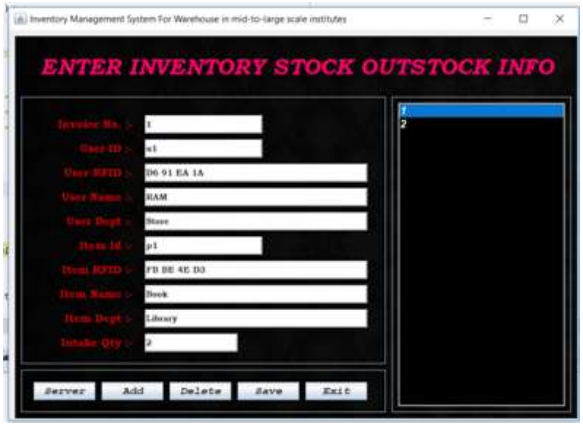

Fig-3 : Fetching out stock by reading card

2) The Theft Alert info is saved to the cloud in Google Spreadsheet with date and time the alert was generated. Alert Notification and item analysis send to Mobile App

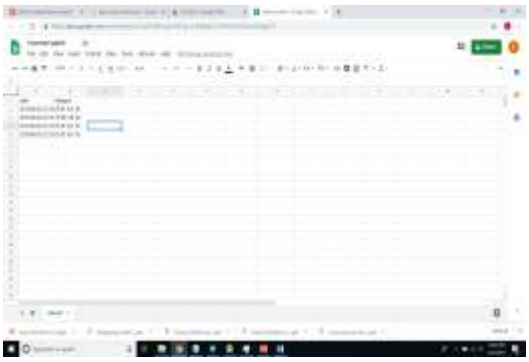

Fig-4 : Theft Alert info is saved to the cloud in Google Spreadsheet

Fig-5 : Theft Alert on Mobile App

6.2 Discussion for communication with cloud And item Analysis

1) The Usage analysis of previous and current items data is generated and send to mobile phone and Google spreadsheet.

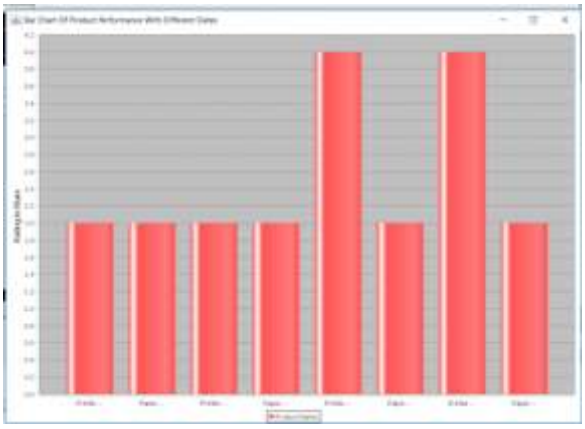

Fig-6 : Item analysis of old and new data

Fig-7: Time to communicate with cloud

7. CONCLUSION

In this paper a novel approach is explained which will increase the ease of inventory management system using IoT, RFID, Desktop, Cloud, Mobile and Machine learning together to develop a smart and intelligent inventory management system. After analyzing, we can conclude that the system which we are going to implement will lead to an 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 or Supervisor.

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