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An IoT Application for Inventory Management

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Abstract: ***Right now, cloud-based inventory systems are able to track items in real-time. Products usually have either an RFID tag or barcode label so that, they can be scanned and identified by the system. Currently, this is how the systems are able to provide visibility into inventory levels, expiration dates, item location, forecast demand, and more. With the IoT, the ability to track and communicate with products will greatly increase.***

For example, RFID tags will hold more info about an object, and communicate that to an inventory system. Built-in RFID tags can send info about temperature, weather, damage to the object, traffic, etc. The proposed system works on same mechanism [4]. Every object is tagged with an RFID tag which emits radio-waves. An RFID reader is used to identify the objects by reading the transmitted radio waves from each tag.

The same way each sector in the inventory is also given an RFID tag which is also need to be scanned along with the object's RFID tag. Because of this, each object can be located accurately inside the inventory and their quantity can be dynamically updated into the database.

In an inventory system, only keeping record of object's quantity and its location is not enough. Some analysis is also needed according to the quantity of materials available in the inventory.

By focusing on this, the proposed system is developed in such a way that it can analyze how much space in inventory is occupied by which material in the inventory.

The proposed system is also capable of generates triggers if items get understocked and send an alert e-mail to the inventory manager. The ability to view, track, and monitor inventory will improve enormously with the IoT. Inefficiencies that are never noticed will become simple to spot and take actions on. Although still in an early stage, the IoT carries enormous potential for both consumer and company.

Keywords: IoT, RFID tags, readers, track, real-time, stocks, monitor, record, radio-waves, etc.

I. INTRODUCTION

The title of the project is "An IoT Application for Inventory Management". In this system a simulation of inventory is designed which contains three racks having three compartments in every rack. This system is designed by taking under consideration the raw materials used in defense industry such as metal rods, metal sheets, nails, etc. The RFID technology is used in this project to identify the materials and update their quantities automatically on to the server without any human intervention.

All the data is stored onto a local server which is designed using HTML, CSS, javascript, PHP, JQuery, MySql and software used is XAMPP.

On the other hand the hardware side Arduino IDE is used and Embedded C programming is used to code for arduino. There is two level hierarchy in inventory which is as manager and employee which will be automatically determined at the time of login and accordingly the access of features will be given to the user.

The systems has been designed by taking motivation from current manual inventory management systems which requires a lot of human efforts and are prone to human errors.

The aim behind this project is to auto-manage all the work that requires human efforts in the inventory system with the help of IoT technology.

To achieve this aim all the materials in the inventory are tagged with RFID tags having unique identification codes in each tags and their associability has been defined in the Embedded C code with a particular material in the inventory. There is graphical representation of each rack on the server side which shows the empty and occupied spaces in the inventory. Hardware has four arduino which sends data to the server after a fixed interval of time. For this purpose ESP8266-1.0 module is used.

II. OBJECTIVES

The system has been designed by focusing on following objectives to be achieved after completion of the project.

A. To remove manual maintenance of data about inventory.
B. To automate the identification of items in the inventory.
C. To easily identify the accurate location of each item, empty and occupied spaces
D. in an inventory by combined use of push-buttons and RFID tags.
E. Just by scanning RFID tags accurate item count should be known without much human efforts.

III. PROBLEM DEFINATION

Defense industry produces custom mechanical products which requires raw materials like metal sheets, metal rods, metal pipes etc. However, there is no track about the current order and current location of these materials.

A. Industry needs a system which gives access to raw materials data like its current order, stage and quantity. The raw materials and their locations need to be tagged with RFID's to access all this information remotely.
B. Wired or Wireless communication between RFID readers and software.
C. Therefore, we are aiming to build a system which will accurately track the location and quantity of materials in the inventory will provide some analysis based on the data generated.

IV. BACKGROUND HISTORY

Kevin Ashton, co-founder of the Auto-ID Center at MIT, first mentioned the internet of things in a presentation he made to Procter & Gamble (P&G) in 1999.

Wanting to bring radio frequency ID (RFID) to the attention of P&G's senior management; Ashton called his presentation "Internet of Things" to incorporate the cool new trend of 1999: the internet.

MIT professor Neil Gershenfeld's book, When Things Start to think, also appearing in 1999, didn't use the exact term but provided a clear vision of where IoT was headed.

IoT has evolved from the convergence of wireless technologies, micro electromechanical systems (MEMS), micro-services and the internet.

The convergence has helped tear down the silos between operational technology (OT) and information technology (IT), enabling unstructured machine-generated data to be analyzed for insights to drive improvements. Although Ashton's was the first mention of the internet of things, the idea of connected devices has been around since the 1970s, under the monikers embedded internet and pervasive computing.

The first internet appliance, for example, was a Coke machine at Carnegie Mellon University in the early 1980s. Using the web, programmers could check the status ofthe machine and determine whether there would be a cold drink awaiting them, should they decide to make the trip to the machine.[8]

IoT evolved from machine-to-machine (M2M) communication, i.e., machines connecting to each other via a network without human interaction. M2M refers to connecting a device to the cloud, managing it and collecting data. Taking M2M to the next level, IoT is a sensor network of billions of smart devices that connect people, systems and other applications to collect and share data. As its foundation, M2M offers the connectivity that enables IoT.

The internet of things is also a natural extension of SCADA (supervisory control and data acquisition), a category of software application program for process control, the gathering of data in real time from remote locations to control equipment and conditions. SCADA systems include hardware and software components.

The hardware gathers and feeds data into a computer that has SCADA software installed, where it is then processed and presented it in a timely manner.

The evolution of SCADA is such that late-generation SCADA systems developed into first-generation IoT systems. The concept of the IoT ecosystem, however, didn't really come into its own until the middle of 2010 when, in part, the government of China said it would make IoT a strategic priority in its five-year plan.[8]

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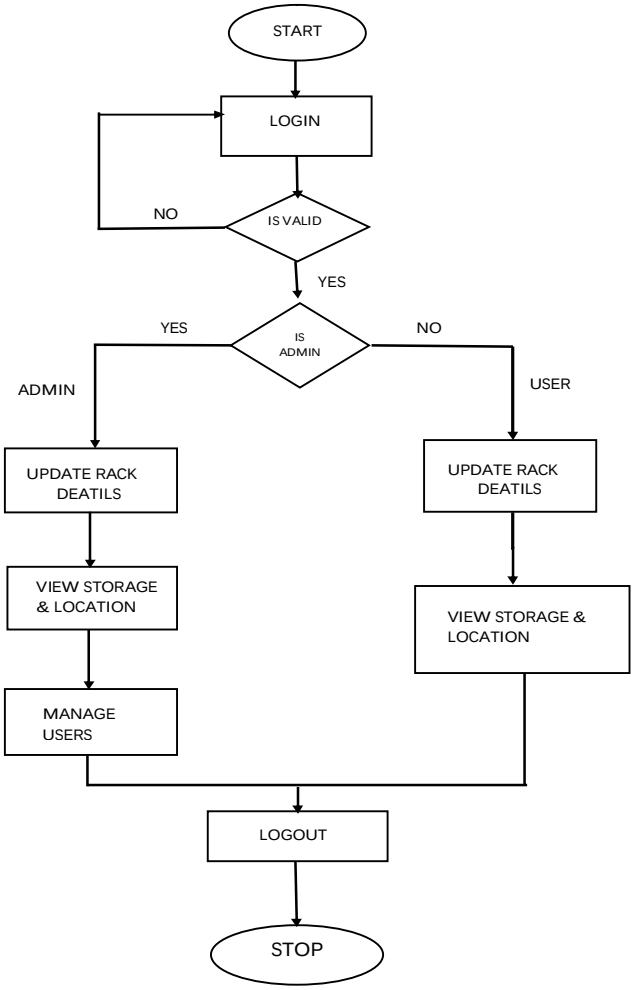
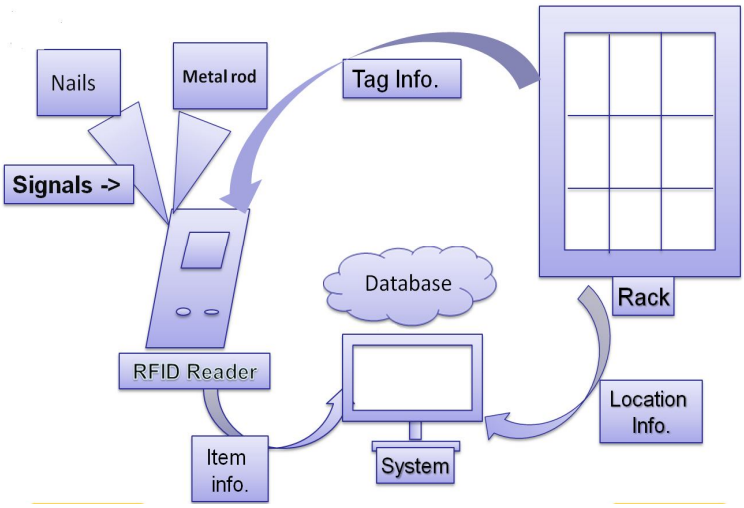
V. FIGURES AND TABLES

A. System Flowchart

It shows how the entire system will work And which type of user will have which type of access to the server. Also it shows what activities will be performed on the server side by users who may be manager or employee in the inventory.



B. Block diagram of Hardware-Software Communication



VI. METHODOLOGY

A. PHP, HTML and MySql are used to develop the website.
B. Website is completely dynamic in nature.
C. Simulation of inventory is designed as hardware.
D. Hardware contains three racks having three compartments each.
E. .Each rack is tagged with an RFID tag and each compartment has pushbuttons installed onto it.
F. One RFID reader has been designed which identifies the tagged material and its standard quantity and sends to the server.
G. On server side graphs are designed which shows analysis of data generated from inventory.
H. There is a two level hierarchy for login into the system either as manager or employee.
I. If logged in user is manager then he/she can see all the data about employees who have access to the system as well as can modify their access credentials.
J. There is a module which shows all the inventory data in form of list containing material's name, quantity and location.

VII.HARDWARE & SOFTWARE

A. Hardware Specification (Minimum)
1) Disc Space: 40 GB
2) PC Used: IBM Compatible
3) Processor: Pentium 3
4) Memory: 512 MB RAM
5) File System: 32 Bit

B. Software Specification (Minimum)
1) Operating System (Server Side): Windows XP
2) Operating System (Client Side): Windows XP.
3) Client End Language: HTML
4) Local Validation: PHP
5) Server Side Language: PHP
6) Database: MySql 2000
7) Web Server: XAMPP server
8) Web Browser: Any browser

VIII. PRAPOSED SYSTEM

Following Work will be done on Hardware side (in Inventory)

A. Adding New Materials Into The Inventory
1) Employee has to press "RESET" button on the reader to clear its memory.
2) Now, employee has to scan the RFID tag on the rack on which he/she is going to add put the material.
3) Next step is to scan the RFID tag on the material once and put it on the rack.
4) Now last step is to press the "ADD" button and data will be sent to the local server.

B. Removing Materials From The Inventory
1) Employee has to press "RESET" button on the reader to clear its memory.
2) Now, employee has to scan the RFID tag on the rack on which he/she is going to add put the material.
3) Next step is to scan the RFID tag on the material once and put it on the rack.
4) Now last step is to press the "REMOVE" button and data will be sent to the local server.

Following Work will be done on the local server (Software side)
a) As soon as the data is sent to the local server, data will be saved into the database.
b) After that it will be displayed in form of list which contains name, quantity and location of the materials.
c) So, if any employee/manager wants to see which material is placed in which rack and how quantity of material is present there then he/she just has to check the list.

d) If any employee/manager of inventory wants check which locations in the inventory are occupied or empty it can be seen through the graphical representation of inventory.

e) There is some analysis of the data about available stock is done on the server side which shows how much space is occupied which material in the inventory.

f) If there is shortage of any material in the inventory then system automatically sends SMS to the inventory manager.

IX. NUMBER OF MODULES

The system after careful analysis has been identified to be presented with the following modules:
The modules involved are:

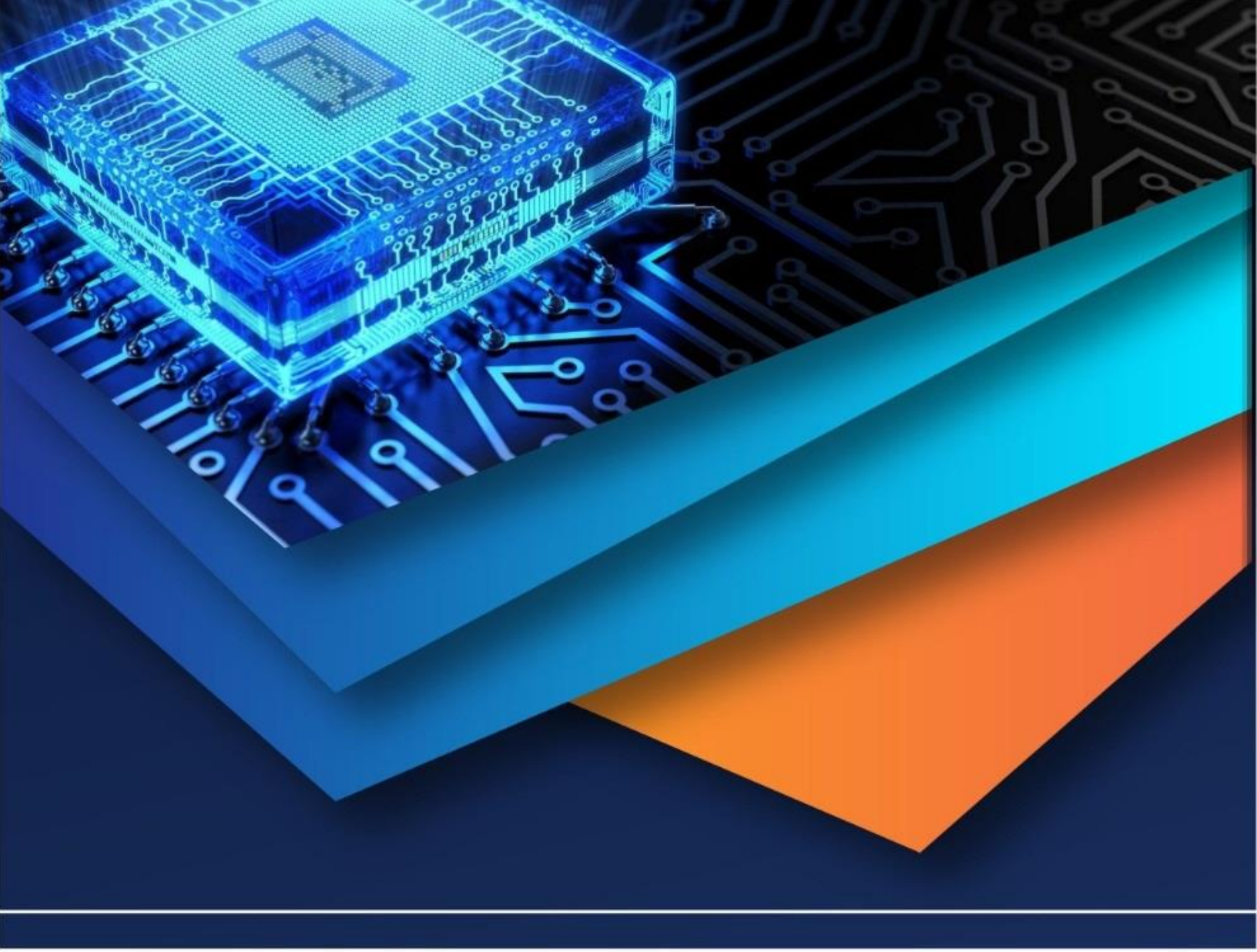
1) *Manage Users:* In this only manager is authorized to add account of new employees on the server and give them access of specific features. Login module which uses email id and encrypted password of user to authenticate the user. List of all employees who has access to the server containing inventory data and manager can update their information as well as modify their access credentials.
2) *Dashboard:* It contains pie-chart which shows how much space is occupied by which material in the inventory. Also there is bar graph which shows how much quantity of material is present as compared to understock limit and graphical representation of inventory is given which shows which location is empty and which is occupied.
3) *Edit Profile:* In this module user can change their access credentials such as email Id, Password, etc.
4) *Storage & Locations:* In this module a list of all the records are shown which contains name of the material, quantity and its location where it is present.

X. CONCLUSION

A good resource management plan is essential for the success of a company in order to minimize current operation costs while maintaining a high customer satisfaction level. However, formulating good resource planning is always a challenge to logistics service providers. It is not uncommon that even experienced logistics planners always spend excessive time in managing resource allocation. This is mainly due to a lack of useful and comprehensive resource information and a relevant knowledge support system.
IoT represents the next evolution of the Internet. Given that humans advance and evolve by turning data into information, knowledge, and wisdom, IoT has the potential to change the world as we know it today for the better.
This project gives accurate quantity and location of materials in the inventory and the prototype of the system has been tested successfully.

REFERENCES

[1] L. Zhang, N. Alharbe and A. S. Atkins, "An IoT Application for Inventory Management with a Self-Adaptive Decision Model", 2016 IEEE International Conference on Internet of Things (iThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing(CPSCom) and IEEE Smart Data (SmartData), Chengdu, 2016, pp. 317-322.
[2] Pravesh Kumar Tejan and Shilpi Kain, “Smart Inventory Management System For Warehouse Industry Using IoT Sensors & Machine Learned Data Analytics”, International Journal of Innovations & Advancement in Computer Science, 2017, pp. 456-513.
[3] Harry K.H. Chowa, King Lun Choya,*, W.B. Leea, K.C. Laub , “Design of a RFID case based resource management system for warehouse operations”, Expert Systems with Applications 30, 2006, pp. 561–576.
[4] DoC. 2005. Radio frequency identification: Opportunities and challenges implementation. Department of Commerce 1–38.
[5] “The Internet of Things for Industrial Machinery and Components.” The CEO Perspective. Web, http://www.sap.com/bin/sapcom/en_us/downloadasset.2014-10-oct-10-16.the-ceo perspective the-internet-of-things-for-industrial-machinery-and-components-pdf.html,10 Oct. 2014
[6] “RFID – A Basic Introduction & Simple Application” https://www.elprocus.com/rfid-basic-introduction-simple-application/
[7] “How the IoT will Transform Inventory Management”. https://www.clearspider.com/blog-internet-of-things-inventory-management/
[8] Internet Of Things (IoT) https://internetofthingsagenda.techtarget.com/definition/Internet-of-Things-IoT



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