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An Efficient Storehouse Robot Based on RFID Tag

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Abstract: ***Automation of the storehouse is a key concept. Every single activity related to the storehouse would be performed without any human intervention. The storehouse management system consists of a line follower robot which navigates through the entire storehouse and transports the cartons from one point to another using pick and place line follower robot. The system also provides an efficient, fast and precise inventory management procedure. The dealers access the storehouse by means of the webpage created specifically of that storehouse maintenance. The robot identifies the product using the RFID tag and reader. This work reduces the cost of man power in the storehouse and it also increases the efficiency of storehouse management system and saves time. The dealer doesn't have to worry about their product since they can track their products in the webpage. Thus, the storehouse system is fully automated and it involves lesser maintenance in the storehouse.***

keywords: ***RFID (Radio Frequency Identification and Detection), Storehouse, Line follower, Pick and Place Robot.***

I. INTRODUCTION

The goal of storehouse is to provide essential space to dealers or users who wish to store their materials according to their requirements. The storehouses found currently around us are human dependent for almost every operation, from transporting the cartons to maintaining an inventory. We humans however tend to get tired or take breaks and leaves, thereby affecting its functioning. Also, human errors become a plausible parameter for its malfunction. A small discrepancy in the storehouse inventory would result in huge problems, as finding the particular carton in such a huge area is close to impossible. Dealers are not aware of the product's placement in the storehouse. A solution to these problems would be an automated system, where instead of humans, robots navigate the area, thereby improving upon the speed and efficiency of the storehouse and reducing or rather eliminating possibilities of errors. It also facilitates precise inventory management. Also there are many tasks like loading heavy or harmful substances, for which robots must be used to ensure human safety. Hence robots form an attractive and efficient alternative to storehouse operation. Hence, Dealers can track their product's status and be at ease. Cost of manpower can also be reduced and thus it saves time. Hence, the fully automated storehouse management system provides faster retrieval of the products that helps us to get information about the status of the database through an unique webpage which is created and maintained for that database.

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II. CONCEPT

As the world moves towards automation, many industries, organizations are moving towards automating their fields. The storehouse stands for storing the manufacturing products in a place for future retrieval of the products. The main aim of this paper is to automate the storehouse management system. The RFID tags [1] and readers are used to scan the products and place them in the respective shelf in the storehouse using the pick and place line follower robot. The dealers can track the storehouse status and the product's position using the unique webpage created and maintained for that storehouse.
The scope of this paper is to reduce the involvement of manpower which reduce the cost and to speed up the storehouse management process. Thereby providing consistency in the storehouse and helps the dealers to be at the ease and not to worry about their products. By making the storehouse management system automated, it saves time and involves less maintenance of the storehouse [2]. The main idea is to draw track in the storehouse for the robot's navigation and only maintenance is that the track must be taken care.

III. RELATED WORKS

In the present-day storehouses, all the operations are handled either completely or partially by humans. With technological advancements some storehouses developed and included machinery in their operations to allow easier loading and unloading mechanisms. Not only that, these machineries, improved upon the speed, and ensured human safety in case of harmful materials. However, these are not automated systems, their movements are controlled by humans. Also, the inventory is updated and managed by humans.

Amazon, seeing the need for high speed delivery of the right materials, brought the Betty Bots from Kiva solutions. With the help of these bots, the desired shelf containing the material was brought to the workers, so that they could choose the materials to be delivered from the shelf. The Swisslog robots form another popular storehouse robot known for its technique and great efficiency. These robots are used for automation in the field of pharmacy. These robots are called the 'Pill pick' as it helps the hospitals to eliminate the medication errors during packaging and dispensing thus ultimately increasing the patient safety.Thus, the human workers no longer have to walk around the large area of the storehouse. These modifications are precise in their operations and have helped to speed up the whole process of storehouse by 2-3 times its previous rate. However, here the process is not completely automated [4]. Humans are required to select desired items from the shelf brought in and also to update the inventory according to the movement of items. This paper describes ways to improve on the systems currently in place by creating a completely automated storehouse [3].

IV. EXISTING METHODOLOGY

In the existing system, implements the storehouse management system using the barcode technology. The robot scans the products in the shelf using a barcode technology and picks the product and place it in it's desired destination.Some of the disadvantages of the existing methodology are the line-of-sight with each code should be maintained with the scanner. The type and volume of data on barcodes is more limited. There is no information provided at the status of the work in the storehouse management system.

V. PROPOSED SYSTEM

The main idea is to scan the products placed in the storehouse using the RFID technology. A pick and place line follower robot is used to transport the products from the source to the destination. A unique webpage is created for the displaying the status of the storehouse. In that webpage, the Manager of the storehouse can enter the source shelf number and the destination shelf number. Each shelf contains a unique RFID tag. The RFID reader is placed in the pick and place robot [5] so that it scans the RFID tag to identify the desired shelf. The pick and place robot is operated using line follower robot which tracks the path using the track specifically made for the robot movement in the storehouse that touches each shelf inside the storehouse and in the manufacturing products place. When the manager enters the shelf numbers then the pick and place robot scans for the RFID tag for the desired source shelf. When it tracks the tag with desired shelf using the RFID reader then the robot picks the product placed in that shelf and navigates to the storehouse and scans for the tag with the desired destination shelf. When the tag with desired shelf is encountered then the robot places the product in that shelf. The webpage is updated after this process representing the status of the products in the manufacturing products end and in the storehouse. This webpage helps to keep the product in the shelf of our interest and gives information about the availability of shelves in the storehouse. Using this information Manager can select the shelf that is available in the storehouse and also can notify the Manager when the storehouse is full. Thus, the dealers can also view the product's status using the webpage. Figure 1 shows the block diagram of the proposed work.

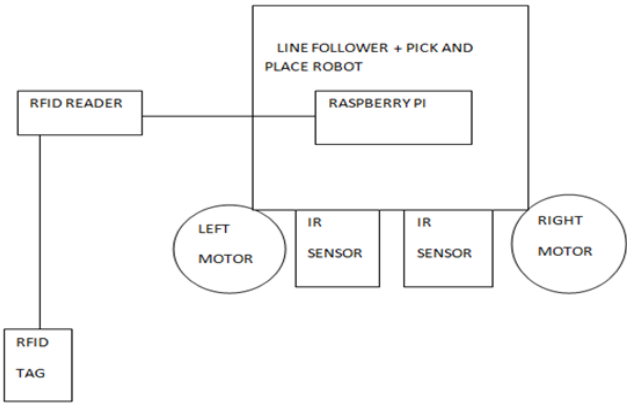

Figure 1: Block Diagram of the Proposed System

Since, RFID is tremendously faster than barcode scanning and allows for accurate inventory in adverse conditions it has high speed and accuracy. RFID is a "near field" technology, so the scanner only needs to be within range of the tag to read it which helps in eliminating the error. The use of webpage also helps manager and the dealers to know about the status of the products in the webpage.

VI. RESULTS & DISCUSSION

A unique webpage is designed to control the storehouse management by the manager. This webpage is controlled only the supervisor or the manager of the storehouse. The initial webpage is displayed as below in the figure 2.

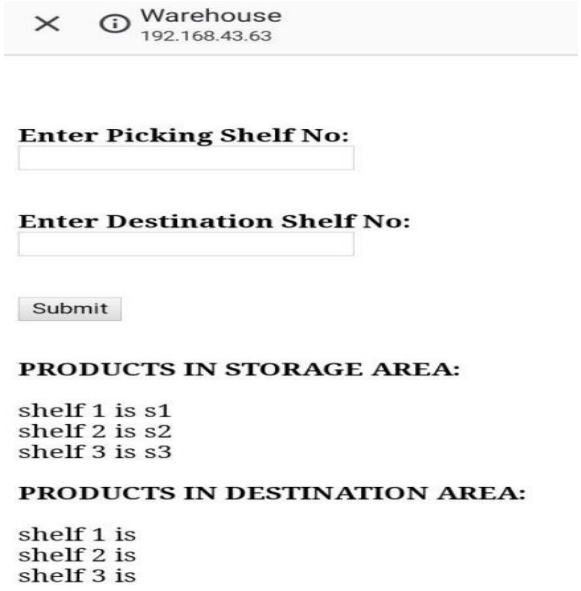

Figure 2: Image of the Initial Webpage

The Manager has to enter the shelves number from where the product has to be picked and to be placed in the storehouse. Entering of the data is shown in the figure 3.

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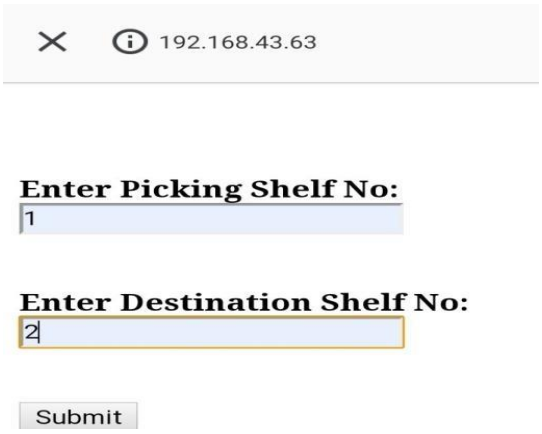

Figure 3: Data entered to pick the product.

When the webpage is updated, the robot scans for the required RFID tag that is desired for that specific shelf. When it reads the desired tag for that respective shelf it picks the product.Figure 4 shows the robot picking the product from the source shelf.

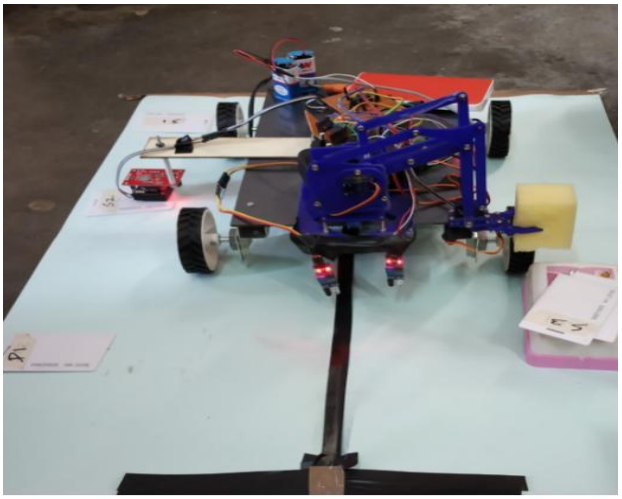

Figure 4: Product Picked From Source Shelf

When the product is picked, the robot reads for the tag that is specific to that desired destination shelf. When that tag is read, the robot places the product in its respective destination shelf. Figure 5 shows the robot placing the product in the destination shelf.

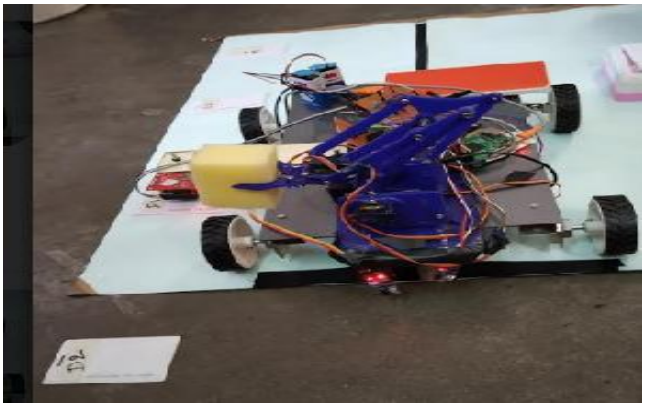

Figure 5: Product placed at Destination Shelf

When the product is placed at its destination, the webpage is updated automatically. Figure 6 shows the automatic updation of the webpage.

Figure 6: Automatic Updation of Webpage

VII. CONCLUSION

This work mainly aims at automating the storehouse management system thereby reducing the cost of the manpower involved in the storehouse management process and it also reduces time for transporting the products from the manufacturing products end to inside the shelves in the storehouse.

Initially the track for the robot movement alone is laid and the track alone can be changed in case of any renovation or extension of the storehouse. Hence, it involves less maintenance. A staff can be employed to check the conditions of the track on the daily basis for the efficient functioning of the robot and also to check the condition of the robot such as the condition of the servo motor, Battery, the IR sensor and the Reader. Hence, the Mana ger can control the overall storehouse management using the webpage. This acts as an efficient method in the storehouse management process. Thus providing consistency about the placement of the products in their respective shelves and the status of the storehouse thereby helping the dealers to get information about their products placement.

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Dr.S. Sasipriya has completed her UG in 1994 from Bharathiar University and subsequently PG from Anna University. She received her Ph.D. in the area of Wireless Communication in the year 2012. She has to her credits 22 paper publications in various International Conferences / Journals. She has organized many sponsored conferences and workshops. She is currently guiding 10 research scholars under Information and Communication Engineering. Her area of research includes Interference Cancellation, Signal Integrity and MIMO. She is a member of ISTE, IEEE and IETE. At present she is working as Professor in the Department of ECE in Sri Krishna College of Engineering and Technology.

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