Automatic Human Follower Shopping Trolley

Om Ravi Mhaskar[1*], Aditya Sandip Benichetake[2], Arjun Amar Dalavi[3], Shrivardhan Rajesh Chavan[4],
D. V. Patil[5]

[1,2,3,4,5]*Department of Electrical Engineering, Sharad Institute of Technology, Yadrav, India*

Abstract: **Arduino RFID based design, has acquired the status of most happening field in shopping market. This is highly specialized field that has the power of integrating large number of components on shopping trolley. Nowadays when we are going to the shopping mall, we have to first take the trolley and then proceed to products lines. Then we put items in the trolley which we intend to purchase. After all the shopping we moved toward the cash counters. And wait in the long queues for payment. After paying money we have to check out the shopping mall. In order to overcome the disadvantage such as waiting for payment as well as reduce wastage of time, we are developing fully automated "Smart Shopping Trolley" system. In this system, when you take the trolley for shopping and putting the products in the trolley which you wish to purchase, the sensors which are mounted on the trolley read the information of the product and directly send to the main server. And there is no need to waiting in the long queues. You can directly do your payment as your full information is already to the counter.**

Keywords: **RFID sensor, Arduino, Mechanical trolley.**

1. Introduction

In today's world the life of people is becoming complex. The value of the time is increased to the top level. In this project module, we are designing system by using electronics as well as communication-based module. It provides user friendly operation i.e., it requires less space, power as well as it operates automatically. Therefore, anybody can operate it very easily. This project represents new technology which provides opportunity to customer to reduce time and it improves service. In this design, we are using two important device such as Radio Frequency Identification (RFID) & Arduino. Radio Frequency Identification (RFID) Uses radio-frequency wave to transfer data between a tag and reader. It fast and does not require any physical contact between a reader and tagged item. It Consist of RFID tag and RFID Reader. Arduino is controller to control the overall operation of system. Arduino-Uno is used here, for controlling the sensor and RFID operation. The ultrasonic sensor is used here to sense the human and provide corresponding signal to Arduino, for the human for lower operation. In this way we are developed "Automatic human follower shopping trolley.

2. Objective

The main objective of this project is to eliminate the loss of valuable time required for billing and waiting in long queues.

and handling for trolley. This will also help in reducing the manpower required for the billing purpose.

3. Concept

Smart shopping trolley consists of RFID (both tag and reader), processor for interfacing, and thus the scanning process is done by using RFID reader which is present on each shopping trolley of shopping mall. RFID Tag is basically wired coil attached with microchip which consist detail information about the product. Information stored in the tag is scan by the reader attached to the shopping trolley. This information is processed and controlled by the Arduino. And this information is interfaced with the Bluetooth transmitter. This transmitter sends the information of the products which are intended to purchase to the receiver of the Bluetooth, which is located at the main server. The main server is attached to the computer accounting system. And it ready to print. For example, if customer purchased 10 products, then the details of that 10 product i.e., prize of that product and corresponding name provided towards the workstation and total cost of that 10 product is done & Bill of products is ready with less time. Therefore, it reduces the human effort as well as time.
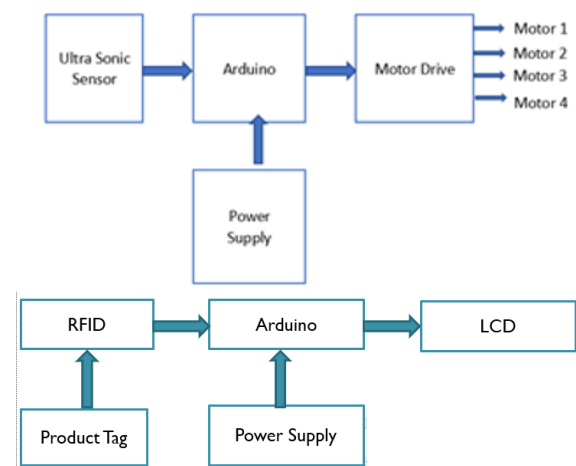
4. Block Diagram

Fig. 1. Block diagram

Ultrasonic sensor senses the human and transfer signal to Arduino. Then Arduino control motor driver, and motor starts

rotating.

Product tag of each product will be sense RFID (Radio Frequency Identification) and signal are sent to the Arduino and corresponding bill will be display on LCD.

5. Algorithm with Flowchart

1. When shoppers with the cart press "start button" the system turns ON and then all the components such as RFID reader, Arduino and Bluetooth start working.
2. Every product has an RFID tag which contains unique id. These Ids are fed in the database assigned to the corresponding products.
3. When the shopper drops any product in the cart then the RFID reader reads the tag. The information of the product is extracted and at the same time billing information is also updated.
4. These steps are repeated until the end of shopping button is pressed. Once the "End Shopping" button is pressed the total bill is send to main accounting computer server through Bluetooth.
5. There is also an option provided to delete some of the products from the cart and the bill will be updated accordingly, this goes by the customer choice.
6. At the end of shopping, the customer can straight away pay the bill and leave.
7. Inventory status of the products is also updated at the end of shopping.
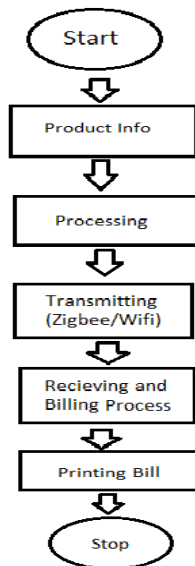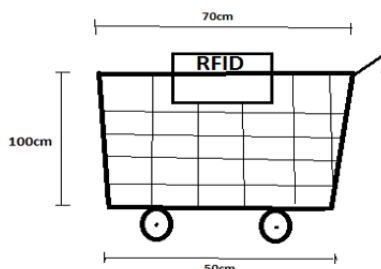

Fig. 2. Flowchart

Fig. 3. Visual construction

6. Working of RFID

The RFID technology has two components – the reader and the tag. The reader has two parts – a transceiver and an antenna. The transceiver generates a weak radio signal that may have a range from a few feet to a few yards. The signal is necessary to wake or activate the tag and is transmitted through the antenna. The signal itself is a form of energy that can be used to power the tag.

The transponder is the part of the RFID tag that converts that radio frequency into usable power, as well as sends and receives messages. When the transponder is hit by the radio waves, the waves go up and down the length of the transceiver, oscillating. You might know that when a wire passes through any sort of magnetic or electric field, it can convert and conduct that field down its length. Like those flashlights, where you shake them and a magnet goes back and forth through a copper coil, creating electromotive force.

Now that the RFID has some power to work with, it wakes up the transponder. The transponder immediately upon being woken up spews out all the information it has stored on it. This whole process can take as little as a few milliseconds.
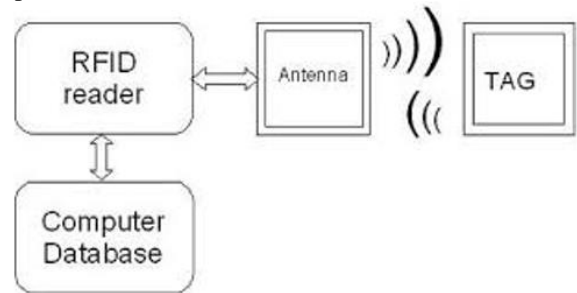

Fig. 4. RFID

7. Bluetooth

1. Bluetooth is used for Communication purpose.
2. Used for transmitting data from controller to main accounting server.

8. Advantage

1. Smart trolley shopping reduces the human efforts as well as it required less man power.
2. It increases accuracy of account section i.e., how many products are purchased by the customer and how many trolleys are currently working in the mall for shopping purpose?
3. It increases loyalty of customer.
4. System allows to self-checkout and increases productive time.
5. Customer can buy large no. of product in very less time.
6. It reduces rush in shopping mall.
7. Customer gets on the spot billing facility.
8. It does not require any skilled manpower.

9. Limitations

1. Smart trolley shopping requires charging facility for working of whole day.

2. It includes new technology therefore design of system is difficult.

10. Conclusion and Future Scope

Thus, we have successfully developed the prototype model which helps to shopping in mall. The model will definitely easy to use, low cost. There are few challenges to make a system design in careful manner as well as make a system reliable.

Acknowledgment

I would like to express profound gratitude to my guide Prof. Mrs. D. V. Patil. on her invaluable support, encouragement, supervision and useful suggestions throughout this seminar work. Her moral support and continuous guidance enabled me to complete my work successfully.

Last but not the least, I am thankful and indebted to all those who helped me directly or indirectly in completion of this work.

References

[1] G. Eason, B. Noble, and I.N. Sneddon, "RFID automation," Phil. Trans. Roy. Soc. London, vol. A247, pp. 529-551, April 1955.
[2] J. Clerk Maxwell, A Treatise on Electricity and Radiofrequency, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp. 68-73.
[3] Jacobs and C.P. Bean, "Exchange information," in Magnetism, vol. III, G.T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271-350.
[4] Ankit Anil Agarwal, "RFID Based Automatic Shopping Cart," Control Theory and Informatics, vol. 1, no.1, 2011.
[5] S. Awati, "Smart Trolley in Mega Mall," in International Journal of Emerging Technology and Advanced Engineering, vol. 2, no. 3, March 2012.
[6] Bellido-Outeirino, and Francisco J., "Building lighting automation through the integration of DALI with wireless sensor networks", IEEE Transactions on Consumer Electronics, vol. 58, no. 1, pp. 47–52, February 2012.