JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

Smart Shopping Trolley with Automated Billing System

M.S.S.S.Srinivas[1], R. Shalini [2], T. Srinu [2], S. Ganesh [3], S. Harish [3] [1]Associate Professor, [2]U.G Student, [2]U.G Student, [3]U.G Student, [3]U.G Student [1]Department of Electronics & Communication Engineering, I. Raghu Institute of Technology, Dakamarri, Visakhapatnam.

ABSTRACT

In metro centers, purchasing and shopping at large malls has resulted in a complex and time-consuming daily activity that drains time when processing payments. In this COVID-19 scenario, this is not only time intensive, but also pose risks. To overcome this, we introduced a Smart Shopping Trolley with an automated billing system. The RFID, GSM and certain display systems are used in this project. It entirely automates the shopping process as well as the billing process, reducing the need to queue. All consumer goods will be equipped with an RFID label that includes the product name and pricing information. The RFID Reader identifies the product once it has been placed in the cart, and the billing is sent to the shopkeeper, allowing the shopping to be completed without any confusion. This will simplify the complexity of time and space. Things speak cloud environment open ware software and Arduino IDE was used.

Key Words: RFID reader, RFID tag, LCD display, GSM, smart trolley system.

1. INTRODUCTION

This project is introduced to avoid the waiting of the customers at the billing counter in the malls or super markets. The main idea of this project is every trolley in all is attached with a framework that can be used as a part of shopping process which avoids the above problem. Every item in the market has an RFID label attached to it, and the cart has an RFID reader, a GSM modem, and an Arduino as its central processor. When a product is placed in the trolley, the RFID reader affixed to the trolley reads the data from the RFID tag and records it in memory. Item can be removed from the bill if the item is removed from the trolley. After the complete shopping, a button is provided to confirm the bill. Once the bill is confirmed the complete bill will be uploaded to the thingspeak environment and the bill collector will receive a message of the bill amount.

The initial inspiration for this project came from an ideology proposed by Dr. Suryaprasad J developed "A Novel Low-Cost Intelligent Shopping Cart" to help users find and select items while also telling them of any special offers present on the item as they walk around the shopping area.

Later IoT Based Intelligent Trolley for Shopping Mall was proposed by Dhavale Shraddha D, Dhokane Trupti J, and Shinde Priyanka S, and it imagined an advanced shopping trolley with an RFID reader and RFID tags for each product. The information is displayed on the LCD screen after the goods have been scanned, providing the consumer with all product-related information. However, the total bill storage in a open ware server was not implemented in this project.

2. EXISTING SYSTEM

Under the current shopping system, customers have to do a lot of manual work and handling. The original billing process involves the scanning of the barcodes, which takes a lot of time for each person, and as a

result, the customers have to wait for the billing process in the long queues, which consumes a lot of time. We made this smart shopping cart with an automatic way to charge for it to get rid of this problem.

Scanning the information for each item takes too much time. Consumers used to manually calculate the total amount to be paid in order to fix in small quantities. Customers must wait in a large line for the transaction to be completed. To read a barcode, barcode readers require a straight line of vision to the barcode.

Fig.1: Traditional method for bill generation (Barcode Scanning)

3. PROPOSED SYSTEM

The RFID reader and switch are connected to Arduino in our project. Products have RFID tags affixed to them. To acquire the total price of the products, a switch is attached here. The same will be shown on the LCD. When we hit the switch, the bill will appear on the LCD and will be uploaded to the cloud server using the GSM Module.

This project is mainly based on the principle of the Radio Frequency Identification System. It operates on the idea of inductive coupling and is powered by radio frequencies or radio waves. RIFDs employ electromagnetic fields to automatically detect and track objects across distances of up to 100 meters.

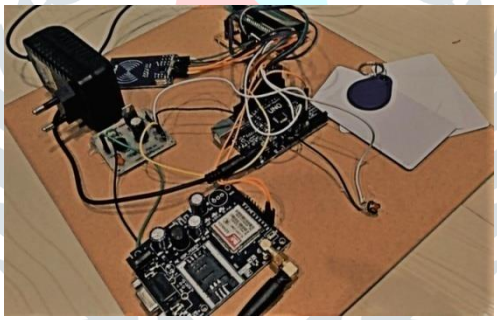

Fig.2: Initial stage of the framework before giving power supply

A transponder/tag affixed to an item to be recognized and a transceiver, also known as an interrogator/reader, is the two primary components of an RFID or Radio Frequency Identification system. An RFID reader may be utilized by insertion of a tag near the RFID reader. A radio frequency module and an antenna that emits a high-frequency electromagnetic field make up a reader. The tag, on the other hand, is normally a passive device, which means it doesn't have a battery. It is instead equipped with a microchip that stores and processes data. The information contained on a tag is read by placing it near to the reader, which then produces an electromagnetic field that induces electrons to travel through the tag and power the chip. The RC522 RFID Reader module is designed to connect with RFID tags by generating a 13.56MHz electromagnetic field. With a maximum data rate of 10Mbps, the reader can connect with a microcontroller. The Arduino Uno is a microprocessor-based board. In this circuit, there are 14 digital input and output pins. A GSM modem, also referred to as a GSM module, is a device that acts as a gateway to the network via GSM mobile phone technology. Mobile phones and other devices connected to mobile phone networks use GSM modems. They link their devices to the network by using SIM cards.

The Arduino IDE is a free and open-source tool that enables users to create and compile programs for the Arduino Microcontroller. It is the official Arduino technology that makes program compilation so simple that even a non-technical person can learn the basics. It works on the Java Platform and is adaptable to operating systems such as MAC, Windows, and Linux. It comes with built-in commands and functions that make it easy to debug, change, and compile code in the environment.

4. BLOCK DIAGRAM

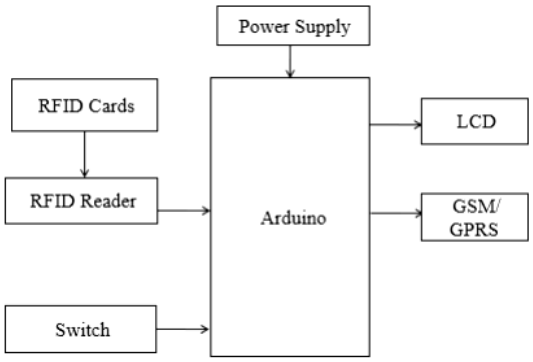

Fig.3: Block diagram of the framework

5. WORKING OF THE PROJECT

The RFID card reader is used to read the product information, which is then displayed on the LCD. The name of the product and its quantity will be saved in the system's local memory. When you've completed purchasing, you can read all of these materials and complete the billing process. Then, the information about the products will be sent back to the server so that it can be updated in the central memory.

Use RFID tags to scan the objects and figure out what they are, and then send the information to the cloud. Here, Billing is computerized, It displays the item's name as well as its price, Update the system after each product purchase, An item can be deleted by swiping it at the reader again. On the LCD display, you can see the entire list of items as well as their prices.

6. RESULTS

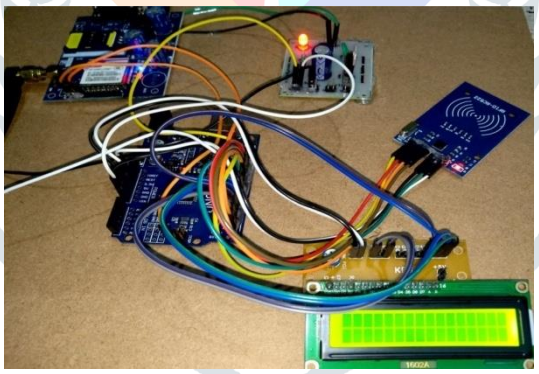

Fig.4: Initial stage of framework (after giving power supply)

Initially a power supply of 5 volts is given to the trolley.

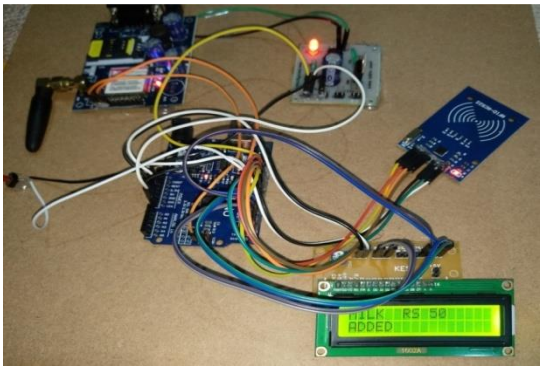

Fig.5: When item is added into the trolley

When the item is placed in the trolley, the RFID reader scans the information recorded in the tag and adds the amount to the memory using the radio frequency identification principle. By placing each item in the trolley, the bill amount is increased by adding the amount of that item to the previously recorded amount in the memory, which is then displayed on the LCD.

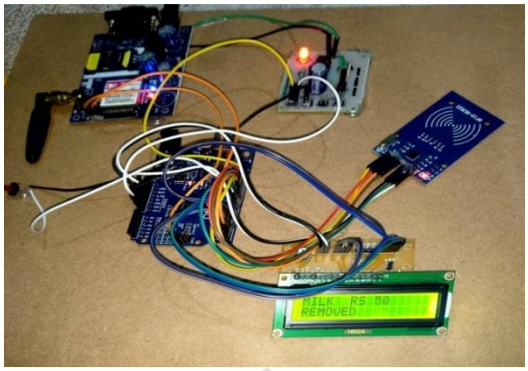

Fig.6: When item is taken out from the trolley

When an item is taken out of the trolley, the scanner looks for the same tag. If it finds it, it subtracts the value of the item from the amount that was already in the memory. This shows that the item was taken out.

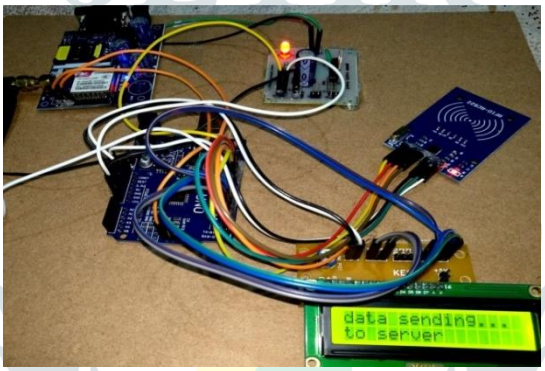

Fig.7: When bill is uploaded to the cloud

When the button is pressed after the purchase, the GSM module figures out how much the bill will be and sends that number to the cloud server. Once the data has been uploaded, the LCD will display a message indicating that the data has been sent.

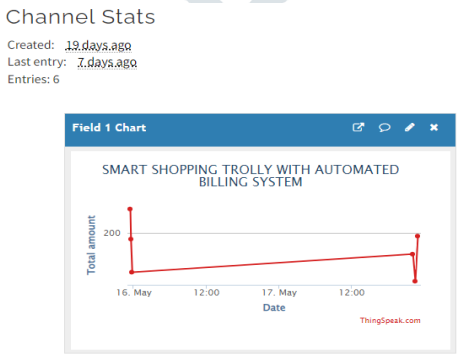

Fig.8: Uploaded data in the Thingspeak cloud environment

The received data can be viewed by the main counter in the Thingspeak environment once the data has been uploaded to the server. In the central trolley operator's Thingspeak account, a channel is created in which he can view the bill amount data of a trolley and check the bill.

Fig.9: Text message after automatic calculation of total bill amount

When the button is pushed after the bill amount has been confirmed, the final bill amount for a certain trolley is sent to the main trolley operator.

7. CONCLUSION AND FUTURE SCOPE

The project's purpose is to alleviate the time and space constraints that occur in shopping malls. Customers may find this technique far more pleasant and comfortable. After the bill has been confirmed and the button has been pushed, the bill will be uploaded to the cloud environment (Thingspeak), where the main counter will be able to analyze the bill. This initiative assists customers in having a pleasant shopping experience.

We can implement an internal navigation system in the future enhancements to identify the required item from the customer's position. When it comes to the actual enactment of this prototype, we've employed a standard RFID reader, which can be upgraded with a high-range reader.

REFERENCES

1. Dr. Suryaprasad J, Praveen Kumar B O, Roopa D & Arjun A K "A Novel Low-Cost Intelligent Shopping Cart", 2014 IEEE.
2. Amine Karmouche, Yassine Salih-Alj, "Aisle-level Scanning for Pervasive RFID-based Shopping Applications", 2013 IEEE.
3. Martin Mayer, Nobert Gortz and Jelena Kaitovic, "RFID Tag Acquisition via Compressed Sensing", 2014 IEEE.
4. Satish Kamble, SachinMeshram, Rahul Thokal& Roshan Gakre, "Developing a Multitasking Shopping Trolley based on RFID Technology", January 2014 International Journal of Soft Computing and Engineering (IJSCE).
5. Mr. P. Chandrasekar, Ms. T. Sangeetha, "Smart Shopping Cart with Automatic Central Billing System through RFID and ZigBee", 2014 IEEE
6. Zeeshan Ali, Reena Sonkusare, "RFID Based Smart Shopping and Billing", International Journal of Advanced Research in Computer and Communication Engineering Vol. 2, Issue 12, December 2013.
7. D. Hahnel, W. Burgard, D. Fox K. Fishkin and M. Philipose, "Mapping and localization with RFID technology", Proc. IEEE Int. Conf Robot. Autom, pp.1015 -1020 2004.

8. H. H. Bi and D. K. Lin, "RFID-enabled discovery of supply networks", IEEE Trans. Eng. Manag., vol. 56, no. 1, pp.129 -141 2009.
9. 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.
10. 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