RFID Based Smart Trolley for Automatic Billing System

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Abstract

Despite the existence of e-commerce, people still prefer to purchase a large number of goods exclusively in supermarkets and shopping centres for their personal enjoyment. Following the queue through the billing process is one of the challenges experienced by clients. Although they just intend to purchase one or two items, waiting for the merchandise to be billed takes time and is inconvenient in today's busy world. According to our survey, supermarkets with high consumer traffic spend a lot of money and time on each customer. The store owners are prepared to accept any intelligent devices that automate the billing process in order to lower the amount of labour and time required for that operation. By completing the billing procedure in the trolley rather than standing in line even for a few items, the major goal is to please the consumer while also shortening the time required for the billing process. After a brief scan, the clients must add the items to the cart, and after they have, the total will be shown there. Customers had two options for paying their bills: using their ATM cards or a pre-recharged customer card that the store offered. In addition to providing protection to deter theft, we have made it easier for users who unintentionally place their projects in the trolley by alerting them. In order to satisfy the needs of both customers and shopkeepers, our ultimate goal is to reduce the time spent waiting in lines while maintaining customer satisfaction, reducing the monotony of barcode scanning, and doing away with the waging of billers.

Keywords: Shopping Trolley, RFID Reader, RFID Tag, IOT, e-Billing, barcode scanning

INTRODUCTION

The traditional barcode system is currently in use at supermarkets and shopping centres in India. The drawback of such a system is that only one product may be scanned at a time. The billing process takes a long time because of this. Take the queue in the illustration as an example. Here, if the first customer has 20 items in his cart, the second customer has 15, but the third customer only needs to purchase one thing, he will have to wait far longer than necessary to be served at the counter because of the customers in front of him. This wastes a lot of time for the individual, the individuals behind him, and the store management. Consequently, we have discovered a much superior solution through our project, which aids in efficient time management when scanning and preparing the bill during checkout. the thing. The product's profit and sales are governed by its economic cost. The product must be reasonably priced and appealing to customers. The manufacturing department's job is to produce goods in response to consumer demand. The work is presently using the shopping carts everywhere. Are basic carrying baskets on wheels a convenience? These carts only serve the goal of transporting the person's to-be-bought things; they offer

no user interaction whatsoever. We are considering ways to make this a more sophisticated system through our project on a "Remote Controlled Smart Shopping Cart." We have included a feature in our project that allows users to view the total cost of their products or items in the cart directly on the cart. The product makes use of an RFID system, which is known for simultaneously scanning several products. Each cart will have an RFID reader mounted on it, and as soon as the customer adds things to the cart, the RFID reader begins scanning the tags on each of them. It then displays the entire bill amount on the LCD that is mounted on the cart along with the RFID reader. As a result, the users of our Smart Trolley receive a Real-Time Response. We have a special weight-checking setup within the trolley so that customers may also check the product's weight.. All these systems combined, make our project "Remote Controlled Smart Shopping Trolley with Automated Billing with the use of RFID", which is a small step towards making a Smarter India

Our project's primary goal is to shorten the time spent in line at the billing counter. We are able to simultaneously scan several objects thanks to RFID technology. In order to speed up checkout times, an RFID Reader/Writer is attached on the cart. It scans items placed inside the cart in real time and displays the total on the LCD displayed on the trolley.

EXISTING SYSTEM

Bar Code used in the existing System. The Readings if any one side of the code is deleted or rubbed, it can become useless. System of waiting becomes too late for customers to receive goods. Labor resources are required, and they might incur additional costs. It Takes More Time because if the barcode on one product is removed, all the other customers must wait until the same product is replaced.

Limitation: Scratched or crumpled barcodes could lead to issues, and system failure could result in longer delays. These Data need to be encoded in the barcode, which adds to the processing time. Durability and price are the two drawbacks of laser scanning.

PROPOSED SYSTEM
HARDWARE COMPONENTS
1) ARDUINO UNO

AREF stands for Analog Reference, and Arduino is an open-source platform. It is occasionally used to establish an external reference voltage as the maximum value for the analogue input pins, which is typically between 0 and 5 volts. Platform for electronic prototyping built on adaptable, user-friendly hardware and software. It is aimed towards designers, enthusiasts, and anybody else interested in making interactive environments or products. With the use of additional sensors, Arduino is able to sense its surroundings and use that information to drive motors, rolling lights, and other actuators. The Arduino development environment and the Wiring-based Arduino programming language are used to programme the mic rd (based on Processing). Arduino projects can interact with software running on a computer or work independently of it. (e.g. Flash, Processing,). Arduino received an digital Communities section of the 2006 Ars Electronica Prix. Credits

2) LCD (LIQUID CRYSTAL DISPLAY)

A flat panel display known as an TV(Liquid Crystal Display) which operates primarily using liquid chargers. Since they're constantly used in cellphones, TVs, computers, and instrument panels, LEDs offer

a wide range of operations for consumers and enterprises. Any number of colour or snap pixels are arranged in an array on a thin, flat display that's placed in front of a light source or glass. A column of liquid demitasse motes suspended between two transparent electrodes, two polarising pollutants with vertical opposition axes, and a column of liquid demitasse motes make up each pixel. Light flowing through one would be dammed by the other without the liquid chargers separating them. The liquid demitasse twists the polarization of light entering one sludge to allow it to pass through the other.

3) EM-18 RFID READER
One of the popular RFID readers for reading 125KHz tags is the EM-18. It has a low price, little power usage, a tiny form factor, and is simple to use. It offers Wiegand26 and UART output formats. It can connect directly to PCs and microcontrollers using UART and RS232 converters, respectively.

4) RFID TAG RFID
Smart barcodes are used in tags, a sort of tracking device, to identify goods. The term "radio frequency identification," or RFID, refers to the use of radio frequency technology in RFID tags. These radio waves send information from the tag to the reader, which subsequently sends it to the RFID computer software. RFID tags are typically applied to goods, but they can also be used to follow animals, people with Alzheimer's disease, cars, and even products. RFID chip is another name for an RFID tag. An RFID tag has a radio antenna installed on a microchip that has a 12-byte unique identification number.

5) HC-12 TRANSCEIVER
HC-12 serial port communication is a new-generation multichannel embedded wireless data transmission module. Its wireless working frequency band is 433.4- 473.0MHz, multiple channels can be set, with the stepping of 400 KHz, and there are totally 100 channels. The maximum transmitting power of module is 100mW (20dBm), the receiving sensitiveness is -117dBm at baud rate of 5,000bps in the air, and the communication distance is 1,000m in open space

6) Si4463 TRANSCEIVER
The wireless communication is provided in this circuit is Si4463. It has a maximum transmit power of 20 dBm (100 mW) and receiving sensitiveness of - 129 dBm. Two 64-byte Receiver and Transmitter FIFO memories are built into the chip along with a great many advanced features that are not implemented in the HC-12 design. See the datasheet for further information on multiband operation, frequency hopping, etc.

ALGORITHM
Step1 : originally the wain is reset.
Step2 : also the Rfid Label is read by the anthology. if the label is read at odd number of time also the item is added into the wain.
Step3 : If the Rfid Label is read at an indeed number of times it gets abated from the wain.
Step4 : Again, after pressing the reset button the total billing quantum is displayed on the TV screen.
Step5 : also using the pre-charged wain the quantum is debited form the wain.
Step6 : After the final billing is done it's transmitted via HC- 12 transmitter and it's observed at the billing section by the separate person.
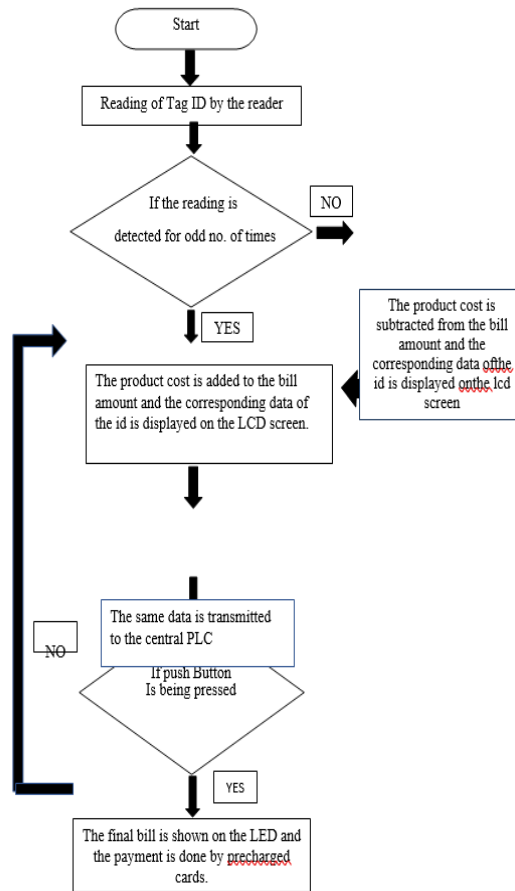
FLOWCHART

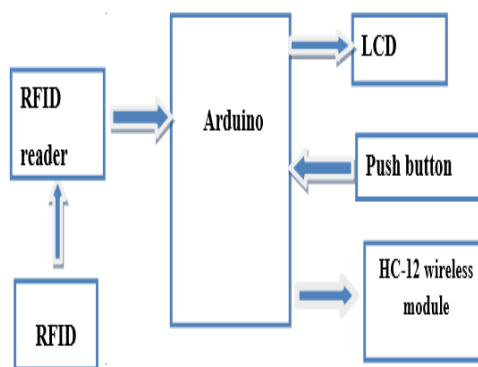Fig1: flowchart of the working of smart trolley

BLOCK DIAGRAM

Fig 2: Block diagram of the smart trolley

RFID READER

A radio frequency identification anthology (RFID anthology) is a device used to gather information from an RFID label, which is used to track individual objects. Radio swells are used to transfer data from the label to a anthology.

Arduino

Arduino is an open- source tackle and software company, design, and stoner community that designs and manufactures single- board microcontrollers and microcontroller accoutrements for erecting digital bias.

LCD

A liquid- demitasse display(TV) is a flat- panel display or other electronically modulated optic device that uses the light- modulating parcels of liquid chargers combined with polarizers. Liquid chargers don't emit light directly,(1) rather using a backlight or glass to produce images in color or snap.

HC-12 WIRELESS MODULE

The HC- 12 is a half- duplex wireless periodical communication module with 100 channels in the433.4- 473.0 MHz range

This involves adding consumer mindfulness by pressing the global link between the goods we consume and the conditions of the people who make and transport them. The idea is that everyone will realize how important a client is in this way.

RESULT

From the analytical report generated from the Customers point of view - waiting time in supermarkets, its easily understandable that after the implementation of the proposed system there is a drastic change in wait time for Billing. When compared with the Previous/Existing method it clearly states that the wait time is 2x times greater than the proposed model

Fig 3: 3D model of the trolley

Figure 3 depicts our 3D model, which demonstrates the model's positioning of components. For the supermarket, our solution only requires a modification to the current trolly system that is more practical and affordable for the owners.
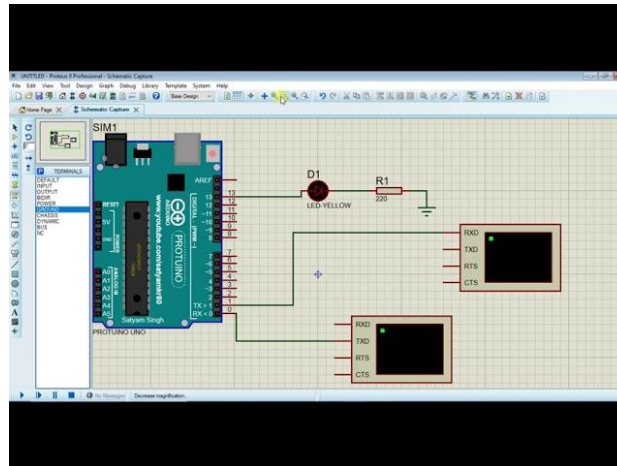
Fig 4: Simulation through proteus software

Figure 4 shows a simulation from the working proteus software that corresponds to the exact model we intend to create. The simulation results are functional, and they will be implemented in the hardware system in the same manner.

CONCLUSION

The Work done with the help of Rfid technology, EM-18 reader and Arduino. It's aimis to reduce the time of billing in long queues so that the customers gets benefited and the sametime inventory management becomes so easy. It can be implemented in shopping malls wherethere is a large crowd and huge rush into malls.

In the world of Automation, This automatic billing system plays a major role in the upliftment of technology. This technology will replace the present barcode system which is present being followed. Hence this technology can help people to make their life's easy and time saving too.

REFERENCES

1. Pandita, Deepali, AshwiniChauthe, and Nikhil Jadhav. "Automatic shopping trolley using sensors." International Research Journal of Engineering and Technology 4.04 (2017).
2. Sainath, S., et al. "Automated shopping trolley for super market billing system." International Journal of Computer Applications 3 (2014): 7-8.
3. Sawant, MsRupali, et al. "The RFID based smart shopping cart." International Journal of Engineering Research and General Science 3.2 (2015): 275-280.
4. L.S.Y. Dehigaspege, M. K. C. Liyanage, N. A. M. Liyanage, M. I. Marzook, and Dhishan Dhammearatchi "Follow Me Multifunctional Automated Trolley" Sri Lanka Institute of Information Technology Computing (Pvt) Ltd. Sri Lanka, Colombo(2017).
5. Yathisha, L., et al. "Automation of shopping cart to ease queues in malls using RFID." International Research Journal of Engineering and Technology 2.3 (2015).
6. Wani, Mukund, et al. "Automatic Billing Trolley." International Research Journal of Engineering and Technology 4.4 (2017).
7. Raji C.G, Vinish, Ganesh Gopakumar and Shahil K, Implementation of Bitcoin Mining using Raspberry Pi , 2nd International Conference on Smart Systems and Inventive Technology (ICSSIT 2019), 27-29 November, 2019

8. Raji C.G, Thasleena V.A, Liloja Basheer and Mohammed Shahzad P, IOT Based Water Quality Monitoring with Android Application, ISMAC 2019, 3rd IEEE International Conference on I-SMAC (IOT in Social, Mobile, Analytics and Cloud), 12-14 December 2019.

9. Chen, Joy Iong-Zong, and Jen-Ting Chang. Applying a 6-axis Mechanical Arm Combine with Computer Vision to the Research of Object Recognition in Plane Inspection." Journal of Artificial Intelligence 2, no. 02 (2020): 77-99.

10. Suma, V. "Computer Vision for Human-Machine Interaction-Review." Journal of trends in Computer Science and Smart technology (TCSST) 1, no. 02 (2019): 131-139.