

Smart Shopping Cart and Stock Management System

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Abstract - This paper presents an initial development of the smart shopping cart (SSC), automated billing system and stock management system that can be integrated into the smart mall system. The SSC can provide customers with the effective user interface so that the shopping service can be excellently promoted. In the current design, with the use of radio-frequency identification (RFID) tags, the SSC can automatically detect the various products which are being added to the cart and show the related information on the user interface. Each product of shopping mall, supermarkets will be provided with a RFID tag, to recognize its type. Each shopping cart is designed or implemented with a microcontroller, LCD, a RFID reader. The centralized and automated billing system can be done by using RFID communication. Finally, the stock management can be continuously monitored and stock data will be transmitted to the cloud server of the shopping mall. The main aim of this paper was to provide an automatic billing system and stock management system to avoid queue in malls and supermarkets and provides effective shopping service.

Keywords: Smart Shopping Cart (SSC), Radio-Frequency Identification, Automatic Billing System, Stock Management System.

I. INTRODUCTION

At current, a huge amount of progress in the field of the internet of things (IoT) technology has given way to new applications and fields. The interfacing with sensors and actuators plays the collective role of environmental sensing, specific computing, and wirelessly connecting devices. Due to the factors accompanied by the effectiveness for miniaturization of hardware, fast sensing equipment, energy saving and scavenging, and the fact that many applications cannot be wired, IoT technology makes it suitable for various application domains such as medicine and health care, environment, and industrial monitoring. Currently, the proliferation of supermarkets and shopping malls, added to the rapid development of IoT technology, has created various intelligent systems for serving customers in shopping Efficiency. Some specific growths, which can help in the transport of products by using a mobile shopping platform or improve the information provided to the user in a more intellectual manner, have been offered in the scientific literature[1-3].

Repeatedly, people encounter a problem of spending too much of their time waiting in queues for billing their purchases in different shopping centers or supermarkets. Waiting in queues undesirably affects human confidence and may cause misunderstandings or struggle amongst people, for instance, when someone breaks the line and stands in front of other people. The proposed project aims to eradicate this problematic by introducing a unique alternative to traditional billing methods, fast-moving up the payment process [7]. The system helps the store management with an automatic update of the inventory on every buying of an item. The Smart Shopping Cart has the likely to make the shopping experience more satisfying and efficient for the shop and the inventory control easier for the store management.

II. LITERATURE REVIEW

In the paper entitled as "Futuristic Billing Trolley Using RFID module and ZIGBEE module". In this system, RFID tags are used instead of barcodes. This RFID tags will be on the product. Whenever the customer puts a product into trolley it will get scanned by RFID reader and product price and cost will be display on LCD display [6].

In the paper entitled as “Smart shopping cart with automatic billing system through RFID and ZigBee”, published by author P. Chandrasekhar and T. Sangeetha, Radio frequency identification technology is developed to prevent automobile from theft[2].

The paper entitled as “Development of Smart Shopping Carts with Customer-Oriented Service” published by Hsin-Han Chiang, Wan-Ting You, Shu-Hsuan Lin, Wei-Chih Shih, Yu-Te Liao, Jin-Shyan Lee, and Yen-Lin Chen, discusses about the Automatic Billing System [4].

III. PROPOSED SYSTEM

This system consists of three sections i.e. Smart Cart, Automated Billing and Stock Management System. The implementation of these two modules which are placed at different places is represented in fig. 1, fig. 2 and fig. 3. Radio Frequency Identification (RFID) is becoming desirable technology as an alternative to barcode systems. RFID systems provide an automatic identification method, relying on storing remotely retrieving data using RFID tags or transponders. An RFID tag is an object that can be attached to or integrated into a product for the purpose of identification using radio waves. Chip-based RFID tags contain silicon chips and antenna. In this paper, we have developed a smart shopping cart system that allows customers to manage their shopping list while shopping and only pay the bill at the checkout counter. The shopping cart has the capability to calculate automatically and display the total prices of all the products inside it. This makes it easy for the customer to know how much he or she has to pay while shopping and not at the checkout counter. This way the customer can receive faster service at the checkout.

A. SMART CART UNIT:

In this unit the Arduino microcontroller is attached to a RFID reader. As the user puts the items in the cart the reader on the cart reads the tag and sends a signal to the controller. The controller then stores it in the memory and compares it with the stored data. If it matches then it shows the name of item on LCD and also the total amount of items purchased. Likewise it keeps on

getting added up finally it transfer the total billing data to billing counter through GPRS.

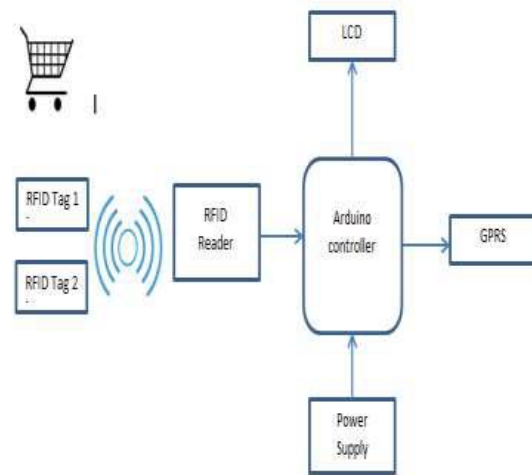


Figure 1: Block Diagram of Smart Cart

B. AUTOMATIC BILLING SYSTEM:

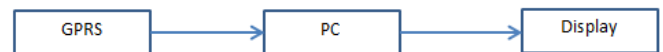


Figure 2: Block Diagram of Automatic Billing

As soon as the shopping is over the user comes near the billing section. The total bill will display on the billing computer [4].

C. STOCK MANAGEMENT UNIT:

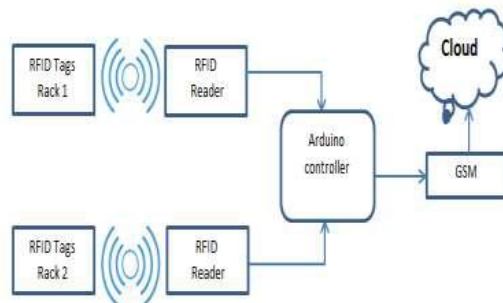


Figure 3: Block Diagram of Stock Management

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The Block Diagram for Stock management system shown in Figure 3 is designed for 2 racks. Whenever customer picks the item from rack that will be detected by respective product RFID Reader. RFID Reader receives that product entered or exited information and sends that to microcontroller. Microcontroller analyses the received information and updates to the concern person email to achieve IoT concept and mobile message via GSM.

IV. HARDWARE IMPLEMENTATION AND DESIGN OF CART

The given fig.1 and 2 shows hardware modules for the device which is integrated to Smart Shopping Cart. It consists of a microcontroller, display unit (LCD), an RFID reader, RFID Tag and a power source.

A. MICROCONTROLLER

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

B. RFID READER

RFID reader consists of an RF module that acts as a transmitter and receiver of radio frequency signal. Transmitter consists of an oscillator to generate the carrier frequency, a modulator to make impact on data commands upon this carrier signal & a receiver that contains demodulator to extract the data returned.

C. RFID TAG

Tags are of two types: passive tags which have no battery life and active tags which have battery life. RFID tags released for automatically identifying a person, a package or an items. These are transponders that transmit information. RFID tag contains two parts. One is integrated circuit for modulating, storing and processing information and demodulating radio frequency (RF) signal. The second is an antenna for receiving and transmitting signal.

V. WORKING AND EXPLANATION

In the present scenario if we consider maximum things are atomized, and when we go to shopping malls we come to see across many complications faced by the people or customers we can say. Like once the customer starts picking up the items or materials from the stock they use to take all those things in a cart and finally when they are done with taking all their required material they use to stand in a long queue to pay the bill. When their turn come to pay the bill at that time some customers face problem in shortage of cash with them and even standing in long queue and standing in front of counter to get the total amount of the purchased item which even consumes maximum time so in order to overcome all these drawbacks we are going to implement one project that is Smart shopping cart for malls [2].

This project is mainly divided into three sections, Smart Cart, Automated Billing and Stock Management System. The collected products are scanned by RFID reader (EM 18), which has a range of 10cm. RFID reader works with the frequency of 125 kHz. It works on DC 5 volts and less than 50 mA current in the mall RFID tag attached products are placed on the rack. Here, passive RFID are used which are powered by RFID reader [3].

Arduino microcontroller is attached to a RFID reader. As the user puts the items in the cart the reader on the cart reads the tag and sends a signal to the controller. Similarly, it keeps on getting added up finally it transfer the total billing data to billing counter through GPRS. Finally, the payment can be done easily. According to updated information from billing, the store will check available remaining stock. If required, it will add new products and update the information to store as well as billing section. The information at the store will also help to order new products.

VI. EXPERIMENTAL RESULTS

Smart Shopping cart, Automatic billing system and Stock management System is developed to obtain following expected results.



Figure 4: Smart Shopping Cart Display



Figure 5: Automatic Billing System using ThingSpeak Server

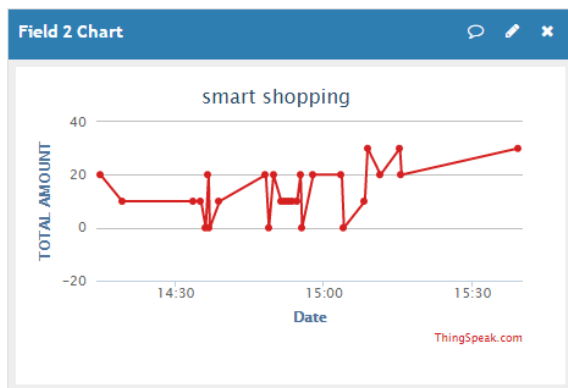


Figure 6: Stock Monitoring System Display

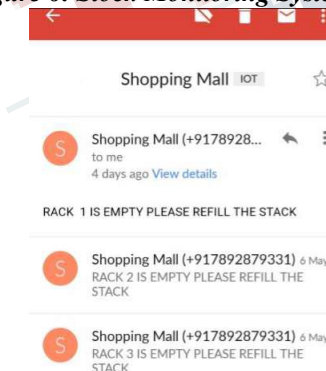


Figure 7: Updating Stock Information to Gmail

VII. CONCLUSIONS

This study develops a smart shopping cart which can be useful for supermarkets and malls. In addition, the automatic billing facility can avoid queue in the check-out process so that the better shopping experience for customers can be created and the stock management can be endlessly monitored. Finally, through the recorded data which links between customers and shopping behavior, the proposed SSC demonstrates the highly potential capability to be integrated into the IOT in supermarkets and malls.

VIII. FUTURE SCOPE

If the frequency of RFID reader is increased the range for detection of the tag is increased. And several scanning of products is possible. In today's era, the products manufactured by the companies are packed and dispatched to dealers. For this purpose, the human resource is involved in marking and identifying the products along with its quantity. This is a time-consuming process. There is a possibility of miscounting of products by the workers. To prevent these problems, a tag can be attached to the product while manufacturing itself. This will help to segregate products easily at various stages of dealing. The correct count can be determined and the manpower required for it also can be reduced. RFID reading range will be improved, hence distance will also increase. This will help for the organization the entire mall more efficiently. It is also possible to pass the collected objects by the customer at the billing section using conveyor belt thus providing automation. Thus, using RFID reader with high frequency and attaching tags to products during manufacturing is beneficial in future.

REFERENCES

- [1] J. Sales, J. V. Marti, R. Marin, E. Cervera, and P. J. Sanz, CompaRob: "The shopping cart assistance robot, Int. J. Distributed Sensors Networks", vol. 2016, Article ID 4781280, 15 pages, 2016.
- [2] P. Chandrasekar and T. Sangeetha, "Smart shopping cart with automatic billing system through RFID and Zigbee", Int. Conf. Information Communication

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and Embedded Systems (ICICES), pp. 1-4, India, Feb. 2014.

- [3] R. Kumar, K. Gopalakrishna, and K. Ramesha, "Intelligent shopping cart," Int. J. Engineering Science and Innovative Technology, vol. 2, no.4, pp. 499-507, 2013.
- [4] Hsin-Han Chiang, Wan-Ting You, Shu-Hsuan Lin, Wei-Chih Shih, Yu-Te Liao, Jin-Shyan Lee, and Yen-Lin Chen, "Development of Smart Shopping Carts with Customer-Oriented Service," 2016 International Conference on System Science and Engineering (ICSSE) National Chi Nan University, Taiwan, July 7-9, 2016.
- [5] Prof. A. D. Kadage, G. V. Mali, M. D. Shaikh, S. D. Shintre, "Inventory Control and Theft Detection in Mall Using RFID," 2016, International Journal of Emerging Research in Management & Technology ISSN: 2278-9359 (Volume-5, Issue-5).
- [6] "Futuristic Trolley for Intelligent Billing with Amalgamation of Radio Frequency Identification and ZIGBEE". International Journal of Computer Applications (0975 – 8887) International Conference on Recent Trends in engineering & Technology - 2013(ICRTET'2013).
- [7] Komal MachhirkeJ, Rupali Rathod, Rinku Petkar, and Manohar Golait: "A New Technology of Smart Shopping Cart using RFID and ZIGBEE", (Volume-5, Issue-2) 2017.