Electronic Smart Cart with Billing Assistance in Super Market

R. PRIYA[1], NA. SWETHA SHRI[2], G. KRISHNAKUMAR[3], S. KALIAPPAN[4], P. JEYABHARATHI[5]
[1, 2, 3]*Student, Department of Electrical and Electronics Engineering, Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India*
[4] *Assistant Professor, Department of Electrical and Electronics Engineering, Kumaraguru College of Technology, Coimbatore - 641049, Tamil Nadu, India*
[5] *Assistant Professor, Department of Electronics and Communication Engineering, Sri Ranganathar Institute of Engineering and Technology, Coimbatore - 641110, Tamil Nadu, India*

Abstract- In this modernistic world, shopping has become inevitable. Standing in queues at the bill counter after shopping is a tiresome process that makes both the customers and billing section employees tedious. In this paper, we bring out a Raspberry Pi-based smart cart that gives an intellectual approach to this tedious process. The main purpose of the project is to reduce the queuing delays at the cash counters of super markets with a scanning system employed in the trolley that makes the billing process easy. In addition, the system also detects the discrepancy done by untruthful customers using a load cell. This project has a great advantage in carrying out the shopping process in a distinct way. Implementing this method would pave a new way in shopping evolution.

Indexed Terms- Li-Fi module, Load cell, Queuing delay, Raspberry Pi, RFID tag, Scanning system, WLAN.

I. INTRODUCTION

The system involves a communication process that mainly relies on Wireless Local Area Network (WLAN) technology. Wireless LAN provides high-speed data communication due to its capacity for small area coverage and is a reliable type of communication. WLANs allow users to move around in a confined area while they remain connected to the network.Traditionally, the billing procedure in shopping malls is in a way that at the counter, salesman creates manual billing by scanning the barcode of each product. This conventional method is reliable but becomes hectic procedure when a long queue is waiting for billing. This process is time-consuming. To overcome these drawbacks, the automatic billing is done using WLAN technology. Unlike RFID based automatic billing, it is not expensive as it does not involve any extra tags for each and every product. Instead the barcode printed on the product is scanned. As the items are scanned and added to the cart, the total price is calculated and is displayed on the LCD.

II. LITERATURE REVIEW

In smart shopping systems, each and every product is equipped with an RFID tag, where RFID readers are attached to smart carts. The user must scan each RFID tag to add products in his cart. After the billing is over, tags must be removed by the shopkeeper so that they would place it on other unsold products. If the tags are not removed, then there will be a cut in profit for shop owner as these tags will increase expenses. Also RFID readers cost more than barcode scanners. This whole setup consisting of RFID tag and reader will increase the amount of time and considerable amount of investment [1]. The proposed project of Li-Fi module based automatic billing system comprises of RFID tag and LI-FI Tx for each and every product. Li-Fi is wireless communication technology and it uses light for data transmission. Li-Fi is very expensive because it needs specialized hardware for implementation. Li-Fi signals are subjected to interference from lightings such as sunlight and common household lighting. In addition, RFID implementation is significantly more complex than the barcoding system [2]. The project of automated billing using Wireless Sensor Networks is

reliable and effective. The system scans the barcode of each and every product and that data is moved to the database by using Wireless Sensor Networks for billing. The Image processing technique is employed to identify the objects placed in the cart [3]. To reduce the time delay at billing sections in shopping malls an intelligent trolley for automatic billing by using RFID and Wi-Fi is proposed. Every product is attached with an RFID tag, as the tag is scanned by the RFID reader it sends the data to the controller. The information of the scanned products is displayed on LCD. After the purchase, the total bill is calculated and is transferred to the customer's smartphone through Wi-Fi. The customer can view the amount by TCP TELNET terminal application [4]. The above methods to automize the existing manual system have become successful only to certain extent. As to implement these procedures in real time, every mentioned system requires high amount of investment and a lot ofchanges to be undergone in structure of shop. This is where the proposed system performs efficiently and cost effectively.

III. OBJECTIVES

- To reduce time consumption.
- To provide proper list of items purchased.
- To reduce the manual workload.
- To alert when an item is dropped into the trolley without scanning.
- To match the weight of the products scanned to the actual weight of the products to avoid malpractice.
- To get prior information about the cost of the purchase before billing.

IV. CONSTRUCTION

The proposed system consists of a shopping trolley inside which a load cell is placed. A load cell is a transducer that converts the pressure of the products applied on it into electrical signals. By using a load cell, the weight of the products can be effectively measured. The controller used is Raspberry Pi Zero W. At the peripheral of trolley, a barcode scanner and an LCD are attached. LCD is used to view all the details of the specific scanned product which will display its price, expiry date, product ID and weight.

Figure 1. Prototype model

V. METHODOLOGY

The proposed system is a connected WLAN network system. The details of the products in the store is initially fed in their database along with its weight and price. It can be then arranged on the shelves of the supermarket. The customer can access any available trolley in the supermarket. Each trolley will have a unique identification number. During purchase, the consumer should scan the product before dropping into trolley. The customer will be able to see all the products which they have dropped inside the trolley listed in the LCD display which is mounted on the trolley. Any form of theft or malpractice can be identified, as the trolley has a load cell. This load cell will alert and report if there is a change in weights of the products scanned to the total weight on the trolley and thereby indicating that an item has been dropped into the trolley without being scanned. Thus, the consumer will have to rescan the items. In any case customer wants to remove a scanned product, they must select remove option from LCD and then scan the product again. After the purchase is over the customer should click on purchase option in LCD. The unique identification code bared by trolley will send information of items

inside the trolley to the database. The customer will get to know all the items being purchased with the exact total amount to be paid even before the billing is done in LCD. During payment, employee at the billing counter will scan the trolley's unique number. The information of items will be shown and only payment should be done at the counter. Thus, this system reduces the billing time and provides the exact amount to the consumer before the billing itself.

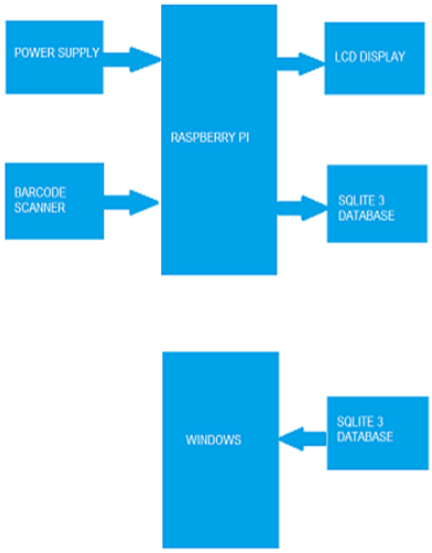

Figure 2. Overall Block diagram of the prototype

CONCLUSION

The system designed will be useful to reduce the billing time and standing queues at the bill counter in shopping markets. The system alsoensures that all the products placed in the cart are being scanned and added up for billing.

FUTURE SCOPE

In future, advanced trolley can be used which doesn't require any manual help of steering. These trolly will be set to run on specific markings like a line follower. Both manual and automatic modes will be provided and it will be left on the customer's preference. As soon as, the purchase option is clicked the information of the items and cost of purchase can be mailed to the customer.

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