Automatic Billing System in Mall

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Abstract—The modern technology has increased the standard of living for the humans. Every one of us craves for a quality in everything we use in our daily lives. So, this has resulted in large crowds at shopping malls which have to lead to long lines at the billing counter because the cashier has to scan every product item and then enter it into the billing record. The prevailing billing system is a bit time-consuming. So, we have an idea of inventing a remedial electronic product to catch-up with this problem. We call it “Smart trolley with the automatic billing”.

RFID generally encompasses any wireless (or partially wireless) communication that allows for remote retrieval of information associated with a particular commodity, product, component, or another item. This project put forwards a unique solution to reduce the average time a customer spends at a supermarket. The product with the appropriate tag is read by the reader on the cart and the product’s details are displayed on the LCD screen placed on the trolley. As the customer puts each product in the trolley, it gets detected. The information of these products along with the bill amount is displayed on the LCD display. The bill amount is sent from the trolley to the server (database) via ZIGBEE which is a short-range wireless communication.

Keywords — RFID Tag, RFID Reader, Zigbee, Arduino

I. INTRODUCTION

As the name “Automatic Billing System in mall”, indicates the main aim of our project that is to automatically billing. RFID (Radio Frequency Identification) Reader is to be used for scan the RFID Tag which is stickled on a product or thing. The automatic task is performed with the help of Arduino. It will make a total of items which is buying by customer and amount will be displayed in LCD. For communication purpose, Zigbee is to be used, which will send the total amount to central pc.

1. Conceptual definition of the system

RFID Reader recognizes the products put in the cart. As soon as each item is placed, various information like item name, price of the products are displayed in the LCD display placed in the cart. Along with this total sum is also displayed. The total bill amount will reach the bill counter by using Zigbee technology. Arduino will do automatic billing process. Then the user has to pay just the total amount and can walk away. Thus Item-level deployment of RFID technology allows for quick checkout that scan all products at once and generates total automatically, eliminating different sectional counters and long queues, which are consistently reported as one of the most negative aspects of supermarket shopping. For automatic billing we are developing, Arduino system based ‘smart trolley’ which is totally automatic. It follows the customer while purchasing items and it maintains safe distance between customer and itself. Only customer has to swap the RFID tag in front of RFID reader.

1.1 Proposed block arrangement of the system

![Proposed block arrangement of the system](image)

1.2 Working of the block diagram

Each basket is attached with RFID Reader. It will read the RFID tags stickled on each item. At payment counter, the net price of all the purchased products is calculated. Customer can get their billing information at the billing or packing section according to their basket Identification Number. Even there is no need for a cash collector, if in case a customer uses their debit/credit for the net bill payment. The automated central billing system consists of a transceiver and a server/system connected to access product database. When the customer enters the shopping mall, he/she will receive a trolley on which there will be a RFID Reader, LCD Display. Thus, now the customer can use the smart trolley for shopping. Whenever the customer places a product into the basket, the RFID Reader will read the tag information and display the related results on the LCD Display... This totally depends on the customer choice. At the end of shopping, the customer can straight away pay the bill and here RF Zigbee module is to be used for the communication purpose to the central pc in the mall or supermarket. Zigbee send the data to the pc and details are displayed on computer and then after pay the bill, vendor can leave the shopping center. Inventory status of the products is also updated at the end of shopping.

1.3 Explanation of block diagram

1) 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.

2) **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 create 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.

3) **Arduino UNO:** For this project, we use a very easy to use microcontroller called Arduino. Arduino is an open source project based the programming language is a variant of C which is straight forward, and the system library is very rich. In the case of the Arduino, the precision is 5/1023 or about 5 mV.

4) **LCD (20*4):** LCD has the ability to display numbers, characters and graphics. The display is interfaced to I/O port of microcontroller (P0.0-P0.7). The display is in multiplexed mode i.e. only one display remains on at a time. Within 1/10th of a second the next display switches on. In this way sequentially on and off display will result in continuous display of count due to persistence of Vision.

5) **RF Zigbee module:** The technology defined by the Zigbee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or more general wireless networking such as Wi-Fi. Applications include wireless light switches, home energy monitors, traffic management systems, and other consumer and industrial equipment that requires short-range low-rate wireless data transfer.

2. Figures and Tables

![Fig. 1 Arduino UNO](image1)

![Fig. 2 RFID tag](image2)

![Fig. 3 RFID Reader](image3)

![Fig. 4 LCD (20*4)](image4)

![Fig. 5 Zigbee](image5)

<table>
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<th>Cost*quantity</th>
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Table 1: Cost Estimation

2.1 Advantages, Disadvantages, Applications

2.1.1 Advantages

Reduces manpower required in billing section. This can reduce the expenses incurred by the management. Users can be aware of the total bill amount during the time of purchase. Reduces time spent at billing counter and Increases customer satisfaction.

2.1.2 Disadvantages

Expensive to implement on large scale. Henceforth, difficult for small scale vendors to implement. Requires constant battery backup. This requires constant care as customers tend to get upset when the find their trolley runs out of power during the middle of their shopping routine.

2.1.3 Applications
We implement to simplify the billing process, make it swift & increase the security using RFID technique. This will take the overall shopping experience to a different level.

Automatic billing of products by using RFID technique will be a more viable option in the future. The system based on RFID technique is efficient, compact and shows promising performance.

II. CONCLUSIONS

On this project we conclude that the customer needs not to stand in a queue to pay the bill. This product makes billing automatic. The inspiration and idea of this paper was drawn from large queues at the shopping mall and the inconvenience that it causes to the costumers. This new system of billing is fast as the single product detail gets recorded as it is dropped into the basket. Working on this product it was noted that RFID technology and Wi-Fi a very vast applications in the near future. Also, RFID is better and faster than bar code reading because the later works on line of sight which is not the case for RFID technique. RFID technology is compact and reliable. Wi-Fi is the wireless network that connects the costumer to the retailer and is very secure with long range of operation. This intelligent shopping system can completely change the way of shopping. The RFiD and Wi-Fi technologies that are not commonly used would find some use commercially. Moreover, this smart trolley will be very beneficial as it would reduce the number of salesmen and billing counters and also prove to be time saver for both costumer and the shopkeeper.

The desired objectives were successfully achieved in the prototype model developed. The developed product is easy to use and economical. Though the project showcases the proof of concept, there are a few aspects that can be included to make the smart shopping cart more robust. To begin with, in this project the latency time of the wireless communication with the server may need to be considered. Secondly, the communication is not very secure. It is impossible to stick RFID tag to some products. In such cases, conventional scanning of barcode is more sophisticated. Further, a more sophisticated micro-controller and larger display system can be used to provide better consumer experience.

REFERENCES