MOBILE FOOLPROOF BILLING AT SUPERMARKETS

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Abstract
This paper briefs the design of a low cost, accurate, easy to use mobile billing in supermarket trolleys for minimizing the time wasted by customers standing in long queues for getting products billed and providing a good customer satisfaction eliminating the need to compromise quality in interest of time saving.

Keywords: Low Cost, Mobile Billing, Supermarket, Trolley, Time Saving, Customer Satisfaction

I. INTRODUCTION

Now a day's people in India prefer shopping at supermarkets and malls due to the availability of different varieties of products. It has actually become a kind of fashion trend in today's world. People find it interesting to buy things at a shopping mall. But a major drawback that leads to customer dissatisfaction is the time it takes for billing. People need to stand in long queues for getting their products billed [8]. In such a situation, automatic billing at the time of inserting products into the trolley would be a welcoming idea. Many solutions pertaining to this idea have been proposed but have not yet been implemented. Hence, this paper have taken up an idea and designed a prototype for supermarket trolleys.

II. LITERATURE SURVEY

Most of our markets are provided with the facility of barcode scanning of products. This is time consuming process where the customer / buyer have to scan each and every product. In festive occasions people who are standing in long queue will find difficult get over home. The shops keepers also will find difficulty in managing the crowd. The barcode scanner has a sensor which converts vertical lines of different thicknesses into corresponding numerical data. For this, it needs a direct line of sight to the barcode for reading it [5]. But in case of RFID system, the tags can be detected at greater distances (up to 300 ft). If a barcode is damaged there is no way to scan the product whereas RFID tags are reusable and rugged as they are covered by plastic coatings [1 4]. This system is more advantageous than the existing methods. The following figure 1 and figure 2 shows the amount. The information of the product is sensed, which contains passive RFID tag [1] on it, through an RFID reader. The information on the tag is used for adding the price of the product to the final billing amount. The final billing amount is transferred to the main computer via RF transmitter [6]. These programs are interfaced through an ARDUINO ATMEGA 328. Figure 3 shows the block diagram and the components used in the prototype model developed. The main concept deals with the objective of detecting the RFID tag and to extract the necessary information, i.e. the price of the product from it, add the price to the total billing amount. Figure 4 deals the flow process in the trolley. The following points describe the procedure to billing the products in the trolley.

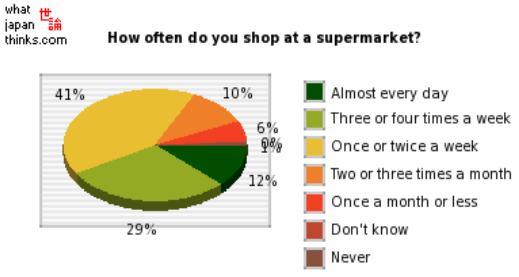

FIG 1: Statistics showing the various frequencies of supermarket usage by people in Abroad (Japan)

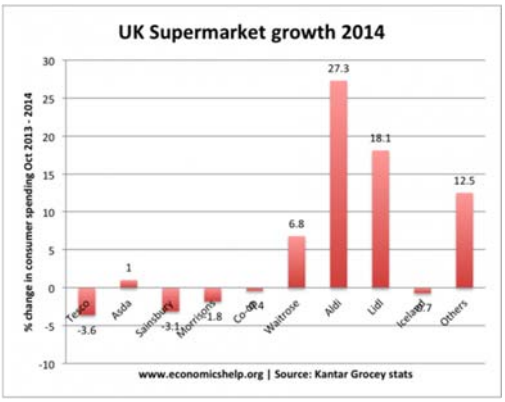

FIG 2: Statistics showing the growth of supermarkets in UK in the year 2014

This statistics shows the percentage of people shopping in supermarkets. When the proposed system is implemented, it will certainly increase the growth of supermarkets and satisfaction of customers.

III. PROPOSED METHOD

Of the different methods proposed, the project has devised an easier system for sensing and processing of the billing

- Place the product with the RFID tag in front of the reader.
- The reader senses the tag.
- The ATMEGA 328 extracts the information on the tag and also counts the number of products in the trolley.
- The price of the product is fetched.
- Added to the main billing amount.
- If any product is removed from the trolley the bill has to be deduced and also the count has to be reduced [4].
- Transfer the billing amount to the main computer when required.

1) RFID system:

RFID systems consist of three components in two combinations: a transceiver (transmitter/receiver) and antenna are usually combined as an RFID reader. A transponder (transmitter/responder) and antenna are combined to make an RFID tag. An RFID tag is read when the reader emits a radio signal that activates the transponder, which sends data back to the transceiver.

There are two types of transponders, which correlate to the two major types of RFID tags:

• Passive RFID tags have no energy source of their own, relying on the energy given off by the reader for the power to respond. Cheaper, passive RFID tags are the most likely to be used for consumer goods.

• Active RFID tags have an internal power source, which it uses to generate a signal in response to a reader. These are more expensive than passive ones. They can communicate over miles like ordinary radio communications. At its most basic level, RFID is a wireless link to uniquely identify objects or people. It is sometimes called dedicated short range communication (DSRC). As shown in fig 3, when a transponder enters a read zone, its data is captured by the reader and can then be transferred through standard interfaces to a host computer, printer.

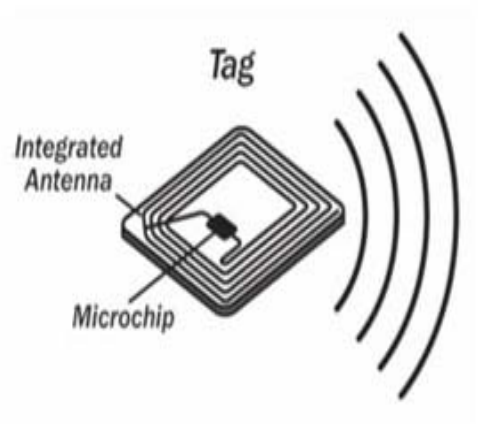

Fig 3: An RFID tag

Sequence of process:

• The antenna emits radio signals to activate the tag and to read and write data to it.

• The reader emits radio waves in ranges of anywhere from one inch to 100 feet or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal.

• The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing.

The data transmitted by the tag is used to provide identification or location information, or specifics about the product tagged, such as price, color, date of purchase, etc.

2) Battery:

The ARDUINO ATMEGA 328 needs an input power supply of 12 V and the RFID reader needs

a power supply of 5V, hence a 12V battery and a power supply module is used.

3) Arduino ATMEGA 328:

The Arduino UNO is a microcontroller board based on the ATMEGA 328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

4) RF Receiver and Transmitter:

The final billing amount calculated has to be transferred to the main computer. As this communication is only one sided, we use an RF transmitter in the trolley and an RF receiver at the main computer.

This is an ASK hybrid transmitter + receiver module employing a crystal-stabilized oscillator, ensuring accurate frequency control for best range performance. There is no requirement of external RF components except antenna. The module is ideal for remote control applications.

5) LOAD CELL:

Since the system is to be made FOOLPROOF, Load Cell is used here for the prototype model. A 5kg Load cell is used.

6) LCD:

The LCD used is ERM1604SYG-1 of 16 characters wide with 4 rows. The Power supply range is 5V and the backlight used is Yellow Green in color.

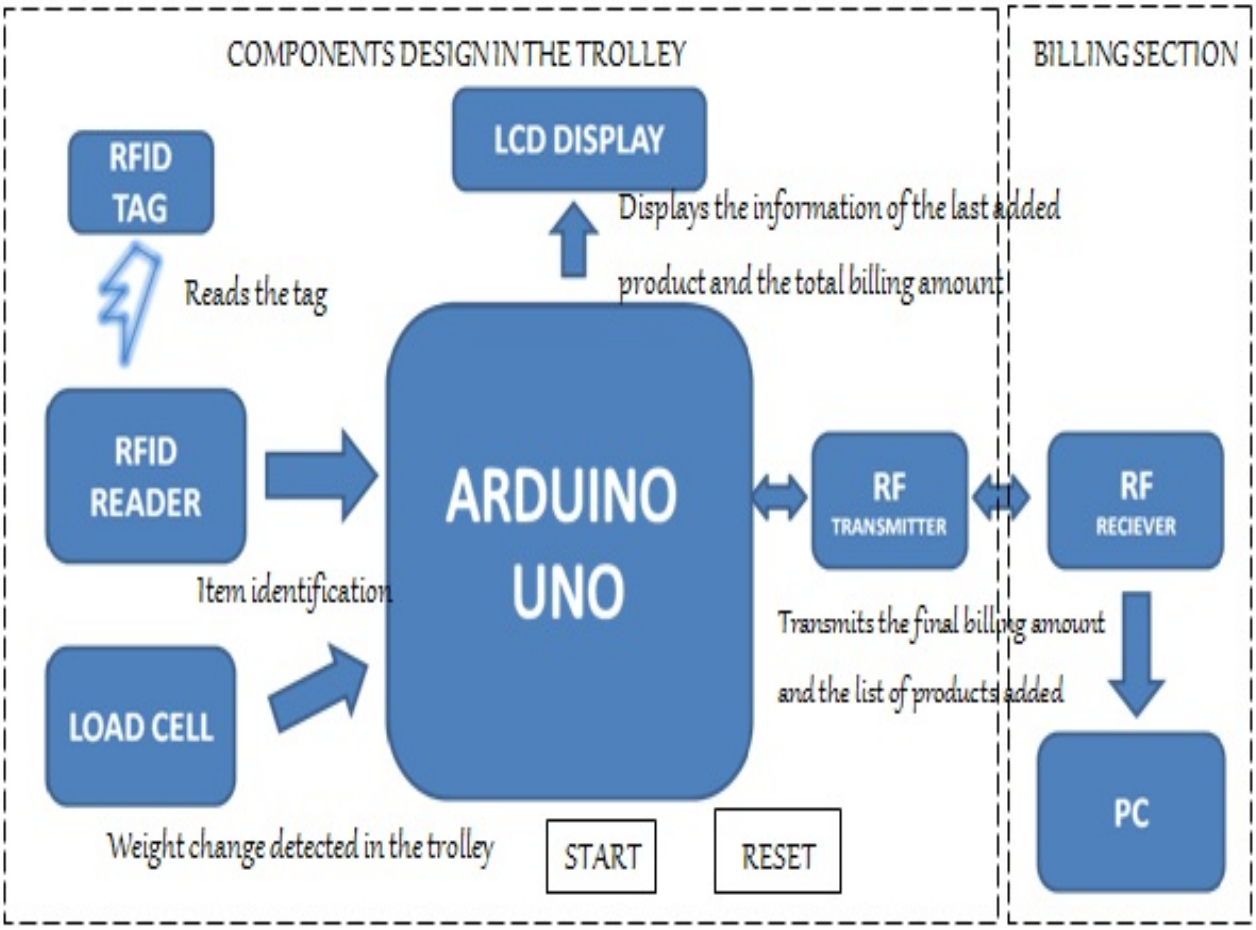

FIG 4: Diagrammatic representation of the proposed supermarket trolley

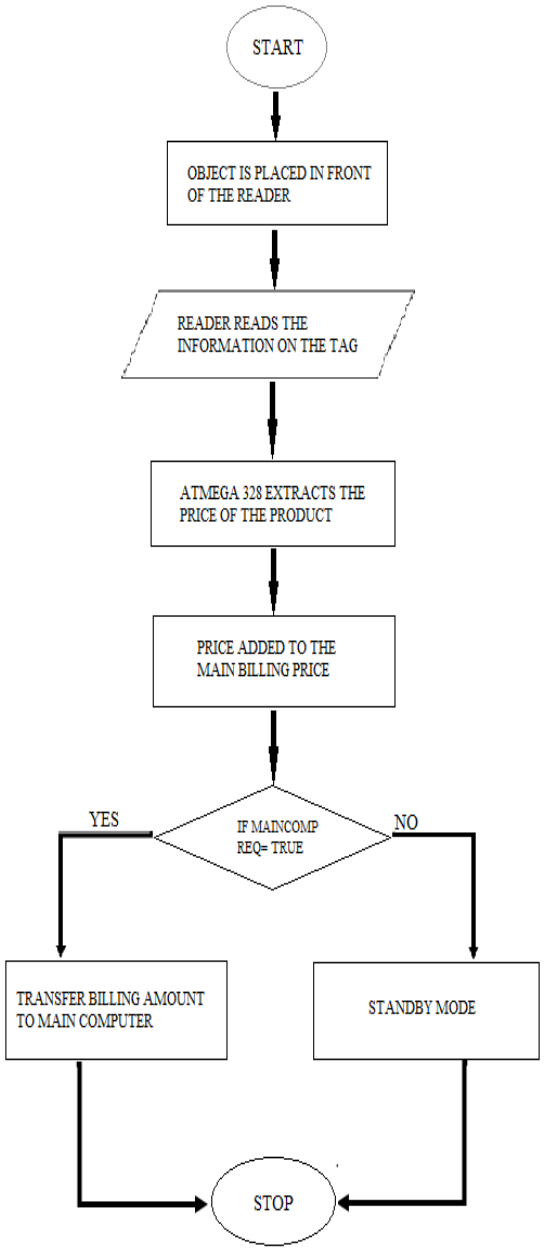

FIG 5: Flow chart of the process in the trolley

IV. CONCLUSION

The working product thus achieves the aim of facilitating automatic billing in shopping malls via shopping trolleys. This setup is handy and can be fixed in all carts in the supermarkets and other big shops. People would find this interesting and would make them happy during purchase. The time wasted in long queues for billing also is eliminated and thus produces a good shopping experience for the people.

V. ACKNOWLEDGEMENT

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