

Automatic Billing using RFID Module

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Abstract

Our motive is to develop a system that can be used in shopping complex s to resolve the challenge of being standing and waiting in the queue. There has been an emerging demand for quick and easy payment of bills in supermarkets. This project describes how to build an automated and time saving system for the world of retail which will make shopping experience impetuous, customer friendly and secure. In this paper, smart cart is proposed that will be capable of generating a bill from the cart itself. The customer will make the payment in no time through a rechargeable credit card which will help to maintain database and introduce schemes and offers in stores accordingly. The smart cart uses RFID technology for purchasing and fee, AVR microcontroller for peripheral interfacing and inventory control. This revolutionary device will assist the stores to look a rise of their income together with delighting customers.

Keywords : AVR Microcontroller (μC), Intelligent cart, RFID technology (products, card and tags).

INTRODUCTION

Now days purchasing and shopping at malls is becoming a daily activity in metropolitan cities. We can see massive rush at shopping malls on holidays and weekends. The crowd is even more when there are special offers and discounts. People purchase different products and put them in trolley. After total buying one needs to go to billing cash counter for payments. on the billing coins counter the cashier prepares the invoice the usage of bar code reader which is a time-eating manner and consequences in lengthy queues at billing cash counters Our cause is to expand a machine that may be used in shopping complex's to clear up the above stated venture. The proto-kind may be positioned in all the trolleys. it will have a RFID reader. All the products in the complex will be equipped with RFID tags. When an individual puts any product in the trolley, its code will be detected and the value of those items will be stored in the memory. As we put the items, the costs will get added to the total bill. Thus the

billing will be done in the trolley itself. Product name and its cost will be displayed on LCD. At the billing cash Counter the total bill data will be transferred to PC by wireless RF modules. The project uses an RFID system where data is processed by microcontroller. Each item will have RFID tag, which would be scanned by RFID readers. The details of the items are transferred to uC using an RFID card reader. The details processed by the uC are then displayed on LCD.

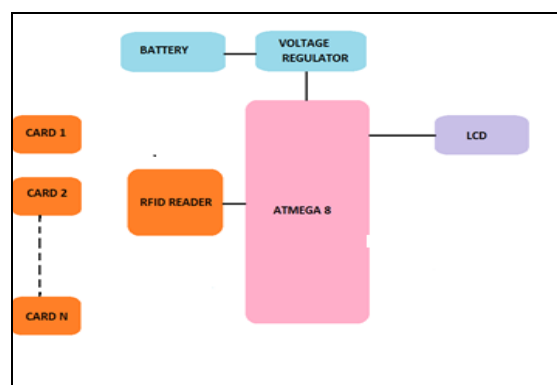


Fig1. Block diagram of Automatic billing system

Hardware Description

Trolley Unit

In this unit the ATMEGA8 uC is attached to a radio frequency identification (RFID) reader. As the user puts the products in the trolley the reader on the trolley reads the tag and sends a message to the processor. This controller then stores it in the memory and compares it with the lookup table. If it matches then it puts the name of item on LCD and also the total amount of the items purchased.

Atmega 328A

The AVR is changed Harvard structure system, where application and records are saved in separate bodily memory systems that appear in one-of-a-kind cope with spaces, however having the potential to study records objects from program reminiscence the usage of special commands. AVRs were used in various automobile packages such as security, safety, powertrain and entertainment systems. Atmel has these days launched a brand new ebook "Atmel automobile Compilation" to help builders with automotive packages. some cutting-edge usages are in BMW, Daimler-Chrysler and TRW. The Arduino physical computing platform is based totally on an ATmega328 microcontroller (ATmega168 or ATmega8 in board variations older than the Diecimila). The ATmega1280 and ATmega2560, with more pin out and memory abilities, have also been employed to develop the Arduino Mega platform. Arduino boards can be used with its language and IDE, or with more traditional programming environments (C, assembler, and so forth.) as just standardized and widely to be had AVR platforms.

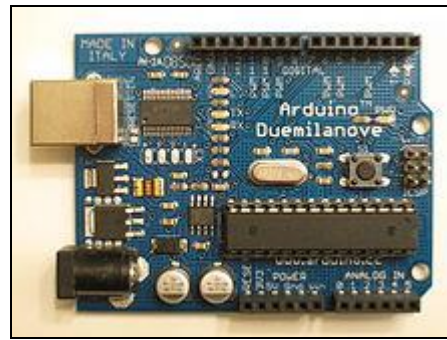


Fig2. Atmega328

Power Supply

The AC supply is applied to 12V step down transformer. The transformer output is +the 12V AC which is reformed using a diode bridge. The output of Diode Bridge of 12V DC is filtered by capacitors.

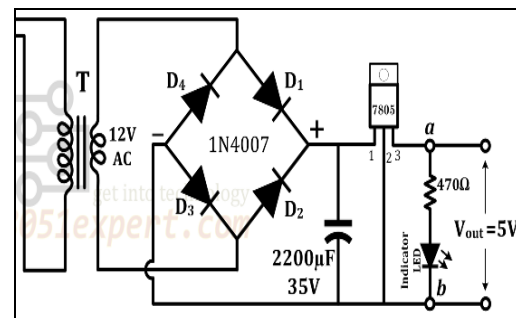


Fig3. 12V Power Supply

RFID Tags

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



Fig4. RFID Tags

LCD Display

Liquid Crystal Display has the ability to display numbers, characters & graphics. The display is fused to I/O port of microcontroller. The display is in multiplexed mode i.e. only 1 display remains on at a time. Within 1/10th of a second the next display switches on.

RF Module

RFID tags - Passive RFID tags for products-Passive RFID tags are attached to the goods and are scanned via the reader attached to the cart. The statistics (product call, RFID variety and fee) similar to respective card receives displayed on the liquid crystal display. Passive RFID tags for consumer – RFID credit playing cards are of brilliant benefit because they permit contactless payment transactions which might be speedy, smooth, can be extra dependable than magstripe transactions, and require most effective physical proximity (in place of physical contact) among the credit score card and the reader. RFID based totally credit playing cards are issued to the user at the time of registration and the card is recharged with money. opened. The bill is calculated and it's miles debited from the person. RFID credit card and manner is complete. RS232 isn't well matched with today's micro controllers, we need a line driver to convert the RS232's signals to TTL voltage levels that will be acceptable to the AVR micro controller TxD and RxD, that is why we are using MAX232.

RF module consists of Radio Frequency transmitter and Radio Frequency receiver. It is a small electronic circuit used to send and receive radio signal. It selects 1 out of a number of carrier frequencies. Types of Radio Frequency (RF) module are:

1. Transmitter module
2. Receiver module
3. Tran receiver module



Fig5. RFID Module

Barcode Vs RFID

If in comparison, RFID era is discovered to be extra

complete than barcode technology. it's far viable to study RFID tags from a more distance. An RFID reader can get right of entry to the data of the tag from a distance of round 300 ft, whereas barcode generation can't be study from a distance of greater than 15 feet. RFID technology additionally ratings over barcode technology in phrases of speed. RFID tags may be interpreted a whole lot faster than barcode tags. Barcode studying is comparatively slower because it requires a direct line of sight. On an average, a barcode reader takes round one 2nd to successfully interpret tags, whereas within the same time the RFID reader can interpret round 40 tags. RFID tags are properly included or both implanted in the product, and consequently isn't subjected an excessive amount of put on and tear. Deciphering a barcode requires an immediate line of sight to the broadcast barcode, due to which the barcode is outlined at the outer aspect of the product,

and is for that reason subjected to greater put on and tear. It also limits the re-utilization of barcodes. As barcode lacks study and write facility, it isn't always possible to add to the records already current on it. Alternatively rewriting on RFID tags is possible. Normal the usage of RFID makes the complete mission modernise together with the much less want of the human efforts in comparison to the bar code method.

Detailed description of the system

The detail description of proposed gadget can be explained as.

Features of RFID based trolley

- Bill calculation at trolley itself.
- Low threat of visitors & mismanagement.
- Discount in help workforce.
- • No extra queue for billing subsequently real purchaser satisfaction.

How the system works?

A purchaser enters into a shopping mall. On entering, she/he first selections up a trolley. each trolley is related to a RFID reader and a barcode reader. a typical trolley is proven in parent 1. whilst the purchaser buy a product, she/he first scans the RF tag of the product the usage of the RFID reader after which locations it into the trolley. facts saved in machine's memory is as compared with the research table. At the same time ATMEGA8 sends the same information to computer for billing purpose with the help of RS232 protocol. Here we have used IR sensor for counting purpose. The recorded data is stored in ARM processor. Counting is mainly done for security purpose. If in case while wandering round the mall someone removes the RFID tag and puts the product in trolley then counting the no of items helps to get information of items purchased. After finishing touch of buying, a secret's pressed indicating final billing of

all the products. there may be a barcode machine in our task. it's miles impossible to paste the RFID tag to a few product like coconut, greens and so forth. subsequently in such cases conventional scanning of barcode is greater state-of-the-art than RFID approach.

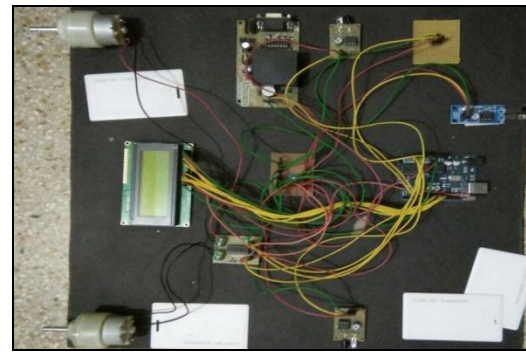


Fig6. Prototype of Automatic Billing

Software Description

The software consists of two segments:

1. Embedded c that is utilized by the hardware that is RFID receiver (geared up in trolley) and transmitter (RFID tags) that look u.s.a. up the specified table of item and maps the product with fee.
2. VB is used on the front end to display the final billed amount to the customer on both the display on the trolley and display exit where the final payment is made. VB has to be ensured as a simpler user interface and embedded C must ensure accurate billing of the items.

Advantages-

The main application of this system is at shopping complex to reduce the billing time and enhancing the joy of shopping. It can be used anywhere in the world like shopping markets, malls, complex's where the barcodes are used a lot which avoids barcode technology. Can also be employed to track items in stock. The proposed trolley is easy to use and does not need any training

RESULT AND ANALYSIS

The utility of trolley will be first of its type for business use, this device information the records of the special merchandise with assist of the suitable sensors like Radio frequency identity (RFID) Tags, this recorded information helps the proprietor with distinct analysis of buying by means of the client & there alternatives thru the computer; printout of the identical can be acquired.

CONCLUSION

With the aid of this we intention to simplify the billing process, make it rapid & growth the security the use of Radio frequency identification (RFID) approach. This can take the general buying revel in to a exclusive level. Distinct parameters consisting of the machine parameters of clever trolley like products call, products fee, product weight and so forth. are constantly show. Thus with the help of the conclusion we can say that automatic billing of products by using Radio frequency identification (RFID) technique will be a more feasible option in the future, the system based on radio frequency identification (RFID) technique is well planned, compact and exhibits promising performance.

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