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Arduino Based Smart Cart

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ABSTRACT: There has been AN rising demand for fast and straightforward payment of bills in supermarkets. This project describes the way to build an automatic and time saving system for the globe of retail which can create searching expertise impetuous, client friendly and secure. during this paper, sensible cart is planned which will be capable of generating a bill from the cart itself. The client will create the payment in no time through a chargeable mastercard which can facilitate to take care of info and introduce schemes and offers in stores consequently. The designed cart eliminates the hassle of self packaging, makes the simplest use of cart space for storing and involves security mechanism for stealing management. The sensible cart uses RFID technology for searching and payment, AVR microcontroller for peripheral interfacing and inventory management. This innovative system can facilitate the stores to examine an increase in their sales beside delighting customers.

KEYWORDS — AVR Microcontroller, Intelligent car, RFID technology (products, card and tags), Retailing system.

I. INTRODUCTION

The past 2 years have witnessed associate explosion of interest in RFID and supporting technologies primarily thanks to their quickly increasing use to trace merchandise through the grocery provide chain. Such applications monitor Store-Keeping Units (SKU) instead of individual product things, since item-level tagging wasn't nonetheless sensible thanks to the comparatively high value of RFID preparation and also the terribly low ratio of grocery store merchandise. however decreasing economic and alternative technical considerations to an oversized extent, one will simply envision a state of affairs wherever every item in an exceedingly grocery store is labelled with an RFID label, looking carts feature RFID readers and doubtless on board computers that acknowledge merchandise place within the cart, and show info and promotions retrieved wirelessly/wired from the system back-end.

Item-level preparation of RFID technology would conjointly provide fast checkout aisles that scan all merchandise promptly and so eliminate queues, that are systematically reported in concert of the foremost negative aspects of grocery store looking. an easy extension of this method would be to use RFID embedded in consumers' loyalty cards to spot people. this selection can be helpful for quicker login to the system and to charge the looking value on to the client account at the location (POS).

II. LITERATURE SURVEY

Shopping within the gift day sometimes involves waiting in line to induce your things scanned for checkout. this may lead to a good deal of wasted time for purchasers. What is more, the technology presently utilized in checkouts barcodes - is from another era, developed within the Seventies. nowadays barcodes are found on nearly each item. Barcodes are a universal technology in this they're the norm for retail product; stores that own a barcode reader will method barcodes and imprint it on the products. the foremost vital issue that's concerned in barcode scanning is that the merchandise ought to be within the Line of Sight (LOS) of the reader so as to induce the barcode imprinted on the product scanned. In 2009, the University of Arkansas data Technology analysis Institute completed a study to work out the business worth of RFID item-level tagging for daily operations at a serious luxury distributer. The chain's management evaluated the employment of RFID tags within the denim class. The results incontestable that overall inventory accuracy improved by over twenty seven %, beneath stocks diminished by twenty one %, and overstocks diminished by half-dozen %. The study additionally compared however long it took to count things mistreatment RFID vs. a barcode reader. With RFID, scanning ten,000 things took 2 hours;

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scanning with a barcode reader took fifty three hours. This translated into a median of four,767 counted things per hour mistreatment RFID, and 209 things per hour employing a barcode system—a ninety six % reduction in cycle-counting time. Nearly fifteen billion pairs of shoes and ten billion fashion attire things ship from makers per annum. the prices for conducting manual inventory of those things, managing out-of-stocks, and preventing thieving still rise. attire retailers are chop-chop adopting item-level pursuit to alter correct visibility of every garment. Perpetual inventories are running at 60-70 % in period, creating it troublesome to form proactive business selections for making in-store sales raise. Specialty attire retailers that style, source, and sell product bearing their own brands are realizing vital results, like a fourteen % sales raise and a ninety percent reduction within the time needed to conduct weekly inventory

Public awareness of RFID was heightened in recent years once the U.S. Department of Defense (DoD) and retail large Wal-Mart needed their suppliers to use RFID technology. In Jan of 2005 Wal-Mart's CIO declared that mistreatment RFID has resulted during a twenty six % reduction in out of stocks within the stores with RFID capabilities, and out of stock things that are replenished thrice quicker than those items not RFID labeled [4]. Bill McBeath in April 2013 aforesaid, to survive in 2013 and on the far side, retailers got to build it straightforward for customers to shop for anyplace, receive anyplace, and come anyplace. The key to the present cross-channel order promising is that the ability, in period, to find and allot out there inventory from any location, whether or not within the store, in DCs, in transit, or on order from the manufacturer. this needs having a awfully correct, real-time, item-level image of inventory in any respect these sources. RFID has established to enhance perpetual inventory accuracy in stores dramatically, by 20%-30%. JC Penney improved perpetual inventory accuracy from seventy fifth to ninety nine in classes mistreatment RFID.

In the gift paper we tend to aim to develop a system which will use RFID item level tagging to use the advantages of RFID similarly as give a system that being value effective will see its implementation in little and enormous scale store

III. PROPOSED SYSTEM

This project brings to promote tremendous opportunities for retailers victimization frequency identification (RFID) technology. historically RFID was accustomed track inventory on provide chains, retailers placed RFID tags onto pallets. currently with this machine-driven system retailers will acknowledge the worth of tagging individual items of merchandise [1] which will overcome the matter of the merchandise being within the Line of Sight (LOS) of the reader. Item- level RFID tagging is proving to deliver product inventory information that's up to ninety nine.5% correct. Retailers can have a certain understanding of their entire inventory and a fast suggests that to assess it. As such, they're equipped to form selections on that product to hold and which to stock and have a good suggests that to considerably increase inventory visibility, lower labor prices, decrease operational expenses and slash the high worth of shrinkage. The wait is over. With RFID-enabled kiosks and fixtures throughout the shop, customers will fancy speedier checkouts and bigger convenience [7]. This line-busting technology will merely communicate with shoppers' good phones to complete transactions on the spot via mobile banking. And as customers look, RFID will collect client info that retailers can grow to be insight to draw in them back once more and again. the massive payoff of RFID is 14%-21% a lot of sales and nineteen more units oversubscribed.

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IV. METHODOLOGY

Block diagram:

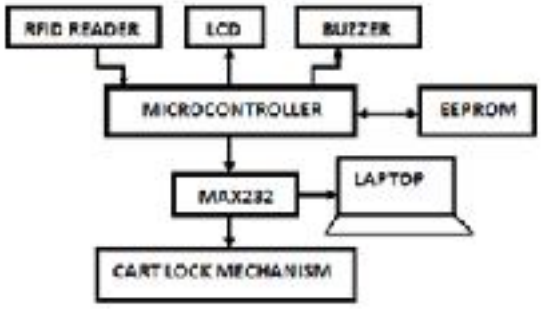

Fig1: Block diagram representation of the proposed system.

The modules enclosed within the system design are as follows:

1. Microcontroller

2. RFID Reader

3. LCD

4. Buzzer

5. EEPROM

6. MAX232

7. Cart Lock Mechanism

1. Microcontroller – ARM has changed Harvard design and is 8-bit RISC single chip microcontroller. it's complete System-on-a-chip. On Board Memory (FLASH, SRAM & EEPROM) and On Board Peripherals are gift. The atmega8535 provides the subsequent features: 8K bytes of In-System Programmable Flash with Read-While-Write capabilities, 512 bytes EEPROM, 512 bytes SRAM, thirty two general purpose I/O lines, thirty two general purpose operating registers, 3 versatile Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a computer memory unit headed Two-wire Serial Interface, Associate in Nursing 8-channel, 10-bit ADC with optional differential input stage with programmable gain in TQFP package, a programmable Watchdog Timer with Internal generator, Associate in Nursing SPI port, and 6 software package selectable power saving modes.AVR is interfaced with liquid crystal display, switches, motor and a buzzer victimisation numerous ports.

LCD is interfaced with port C and D Motor is interfaced with port A Switches and buzzer are

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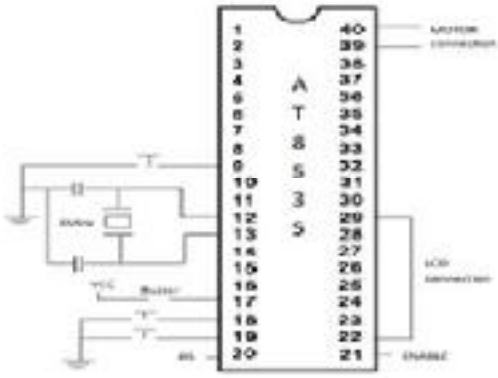

interfaced with port D.

Fig2: Interfacing of Microcontroller

2. RFID reader - frequence identification (RFID) may be a generic term that's wont to describe a system that transmits the identity (in the shape of a singular serial number) of AN object or person wirelessly, victimisation radio waves. not like omnipresent UPC bar-code technology, RFID technology doesn't need contact or line of sight for communication. RFID knowledge will be browse through the build, wear and non-metallic materials.

Fig3: RFID scanning

RFID consists of 2 parts: i. RFID tags - Passive RFID tags for merchandise-Passive RFID tags are connected to the products and are scanned by the reader attached to the cart. the info (product name, RFID range and cost) such as individual card gets displayed on the digital display.

Passive RFID tags for user – RFID credit cards are of nice advantage as a result of they allow contactless payment transactions that are quick, easy, will be additional reliable than magstripe transactions, and need solely physical proximity (rather than physical contact) between the mastercard and therefore the reader. RFID primarily based credit cards are issued to the user at the time of registration and therefore the card is recharged with cash.

Other necessary user data like client name, contact range, email id, RFID range and balance are entered.

ii. RFID Reader - RFID reader (EM-18) is put in within the cart that scans the merchandise which labor under the recess and are entered to the cart. when reading the RFID range corresponding knowledge regarding the merchandise gets displayed on the digital display.

3. digital display – LCD displays the data i.e. cost, RFID product range and name of the merchandise once the product is scanned by the RFID reader. Up/down switches are interfaced with the microcontroller which may be wont to read all the purchases.

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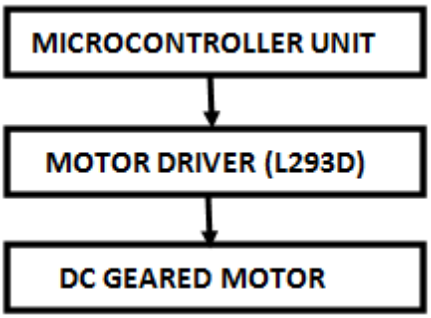
4. Buzzer - A buzzer is AN audio device, which can be mechanical, mechanical device, or electricity. A buzzer is interfaced with the microcontroller to point scanning of the merchandise by the RFID reader.

5. EEPROM - EEPROM stands for Electrically eradicable Programmable browse solely Memory and may be a form of non-volatile memory utilized in computers and different electronic devices to store tiny amounts of information that has to be saved once power is removed. A memory unit, EEPROM is connected with microcontroller to save lots of the info of the data like price and amount of product is browse from the database hold on in EEPROM at the time of request.

6. soap 232- This chip is employed once interfacing small controller with laptop to examine the information measure and changes the voltage level as a result of micro controller is TTL compatible whereas laptop is CMOS compatible. The soap 232 IC contains the mandatory drivers and receivers, to adapt the RS- 232 signal voltage levels to TTL logic.

RS 232 is employed at the time of request. Cart is connected to the portable computer via soap 232 and when association is formed details regarding the purchases are transferred to the laptop and lock is opened. The bill is calculated and it's debited from the user RFID mastercard and method is complete. RS232 isn't compatible with today's small controllers, we want a line driver to convert the RS232's signals to TTL voltage levels which will be acceptable to the AVR small controller TxD and RxD, that's why we have a tendency to are victimisation MAX232.

7. Cart protection mechanism- For locking the cart motor is employed beside motor driver L293D. To derive the DC intermeshed motor close to regarding 50-100 mA current is needed. however any I/O pin of any MCU will source/sink a current of close to regarding twenty mA. therefore for its interfacing with microcontrollers an influence or current



electronic equipment circuit is needed, called motor driver circuits (Refer Fig.5) L293D is employed that may be a H bridge IC to manage the direction of motor rotation.

Fig4: Cart Lock System

When battery is connected to the cart i.e. once it's battery-powered up, it mechanically locks itself. The cart release only it's attested by the operator at the request section. Once the cart is connected via port and details are transferred to the laptop computer then the motor rotates in anticlockwise direction and also the cart is unbolted. The term H bridge springs from the everyday graphical illustration of such a circuit. associate degree H bridge is made with four switches (solid-state or mechanical). once the switches S1 and S4 (according to the primary figure) are closed (and S2 and S3 are open) a positive voltage are going to be applied across

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the motor. By gap S1 and S4 switches and shutting S2 and S3 switches, this voltage is reversed, permitting reverse operation of the motor. mistreatment the terminology higher than, the switches S1 and S2 ought to ne'er be closed at constant time, as this is able to cause a brief circuit on the input voltage supply. constant applies to the switches S3 and S4. This condition is thought as shoot-through.

V. INNOVATIVENESS AND USEFULNESS

The payment of bill by standing in long queue may be a exhausting issue once folks wish to get commodities from marts. Although folks will pay instantly mistreatment electronic cash facility, they're forced to attend within the queue for extended time. the thought that is planned mistreatment RFID technology can overcome the matter and it provides the combined effects of straightforward and versatile implementation, secure transmission of account data, and reduced disputes supply the subsequent edges for all. it'll save time, energy and hands of client, Owner and provider.

With RFID-enabled kiosks and fixtures throughout the shop, customers will relish speedier checkouts and larger convenience. This line-busting technology will merely communicate with shoppers' sensible phones to finish transactions on the spot via mobile banking. And as customers search, RFID will collect client data that retailers can change into insight to draw in them back once more and again. the large payoff of RFID is 14%-21% a lot of sales and nineteen more units sold .

VI. MARKET POTENTIAL AND COMPETITIVE ADVANTAGE:

Smart cart may be interfaced with wireless technologies to form it fully transportable within the close to future. Payment of bills victimisation mobile may be enforced. an occasional price RFID scanner may be factory-made and used which may scan multiple tags (products) at the same time for quicker process and lesser resources. Automatic scanning & handiness of product may be introduced. Pay programing feature are the most recent trend in approaching years because of the boost within the e-commerce business.

VIII. CONCLUSION

The payment of bill by standing in long queue may be a effortful issue once individuals need to buy commodities from marts. Although individuals pay instantly victimization electronic cash facility, they're forced to attend within the queue for extended time. the concept that is planned victimization RFID technology can overcome the matter and it provides. The combined effects of simple and versatile implementation, secure transmission of account data, and reduced disputes provide the subsequent edges for all. it'll save time, energy and force of client, Owner and provider.

VII.FUTURE SCOPE

Smart cart will be interfaced with wireless technologies to form it fully moveable within the close to future. Payment of bills victimization mobile will be enforced. a coffee value RFID scanner will be factory-made and used which may scan multiple tags (products) at the same time for quicker process and lesser resources. Automatic scanning & convenience

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of merchandise will be introduced. Pay programing feature are going to be the most recent trend in forthcoming years thanks to the boost within the e-commerce business.

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