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AUTOMATIC SMART BILLING TROLLEY USING NEAR FIELD COMMUNICATION

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***Abstract*— The purpose of the project is to provide method of doing shopping easily as well as providing some extra features to customers and sellers. Near Field Communication (NFC) reader is used to where it is placed in the trolley can be automatically read the product it will display the quantity and name of the project. Another benefit of the project of the project if the trolley is overloaded and the buying product is expired the system will alert through buzzer All the measured data will upload in the central sever. As a result, Billing can be conducted from the shopping cart itself, preventing Customers from waiting in a long queue at checkout. Tovalidate the feasibility of such a System, in this work we identify the design requirements of a smart shopping system, build a prototype system to test Functionality, and design a secure communication protocol to make the system practical.**

***Index Terms*— NFC reader, ARDUINO, display,buzzer.**

I. INTRODUCTION

Shopping is easy, but waiting at the bill counter can be very boring & laborious. Rush plus cashiers who prepare a bill with a barcode scanner take longer & have longer-lasting results.This innovative project includes an automated billing system that can be placed in a shopping trolley. This automated payment system includes an NFC reader controlled by Arduino instead of the traditional barcode readers NFC's are widespread and taking role in many advanced projects due to its fast and effective .

These NFC's offer more advantages over conventional Barcodes as they have a major drawback which is Line of sight technology and also these barcode tags have constraints in its durability whereas the NFC's tags are more durable and able to read/write data which could even be encrypted. By implementing this NFC technology for unique representation of each product in a market shopping is done more easily.

This could be done by having Shopping trolley installed with an NFC reader to scan each product and load it which is controlled by a micro controller.

welcome text with account balance details is displayed on the LCD screen. Now the system will be ready to start scanning.

II. EXISTING SYSTEM

The Bar coder scanner is used to check the amount of the product.It uses ZigBee to transfer the data to the pc. It does not have a load sensor to check the load other cart..The speed of the system is very slow as it uses zigbee for communication and tally for billing. A shopping mall or a super market is a place where thousands of customers visit every day to purchase many products. Today purchasing various products in malls or supermarkets require a trolley. Product procurement represents a complex process. Each time customer has to pull the trolley for getting the items and placing them in the trolley and also, he has to take care of expense computation. After shopping the customer has to wait in a long queue for product scanning and bill payment. To overcome this, we are developing a smart way for shopping. Each and every product contains RFID tag. The smart trolley will consist of a RFID reader, transmitter. When the customer scans and places any product in the trolley, cost and the name of the product will be displayed. The sum total cost of all the products will be added to the final bill, which will be stored in the micro controller memory. It will wirelessly transfer the product information of the items placed in the trolley using a transmitter to the main computer. So, to avoid waiting in billing queue while constantly thinking about the budget.

III. PROPOSED SYSTEM

The NFC scanner is used to check the amount of the product. The weight scanner is used to measure the maximum weight loaded in the cart. All the measured data will be uploaded in the IOT website with the help of ESP8266. If the product is expired the system will alert through the buzzer.

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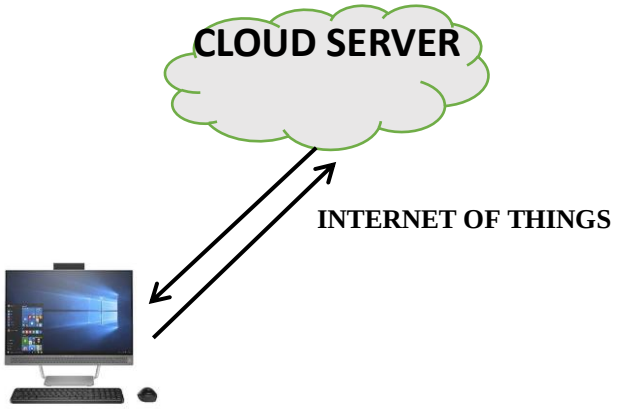

Fig 1: Receiver

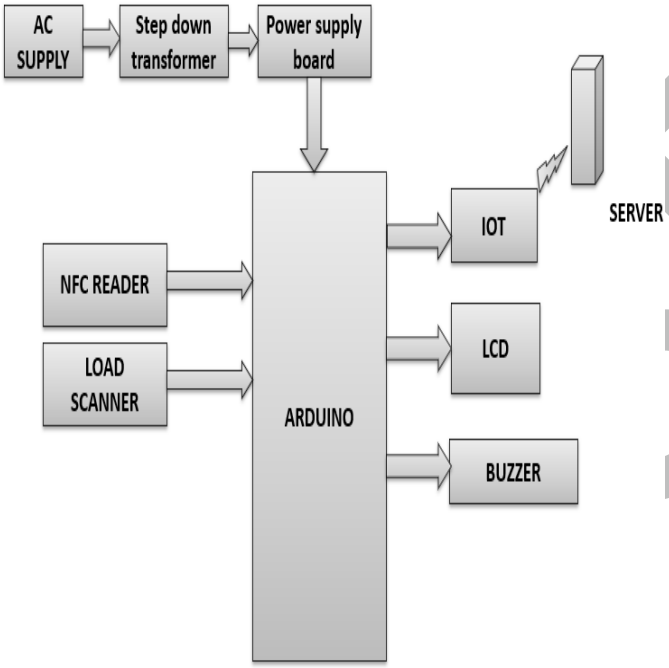

Fig 2: Block diagram of proposed system

NEAR FIELD COMMUNICATION

NFC is the set of the communication protocols for communication between two electronics devices over a distance of four centimeter . NFC offers a low speed connections with simple sectors that can be used to bootstrapping more capable wireless connection .NFC devices act as electronics identify documents and keycards .There are used in contactless payment systems and allow mobile payment replacing are supplementary systems such as credit cards and electronics and smart cards. This is sometimes called as NFC/CTLS with contact less abberivated CTLS. NFC can be used for sharing small files as contact and bootstrapping fast connection to share larger media Such as photos ,videos and other files.

NFC READER

The Reader (Fig 3) is an active device, Which generates radio signals to communicate with the tags (Fig 4). The reader powers the passive device in case of passive mode of communication.NFC gadgets can work in three diverse modes based on the ISO/IEC 18092,NFC IP-1 and ISO/IEC 14443 contactless save card standards.(Read/write, Peer to peer, card emulation)

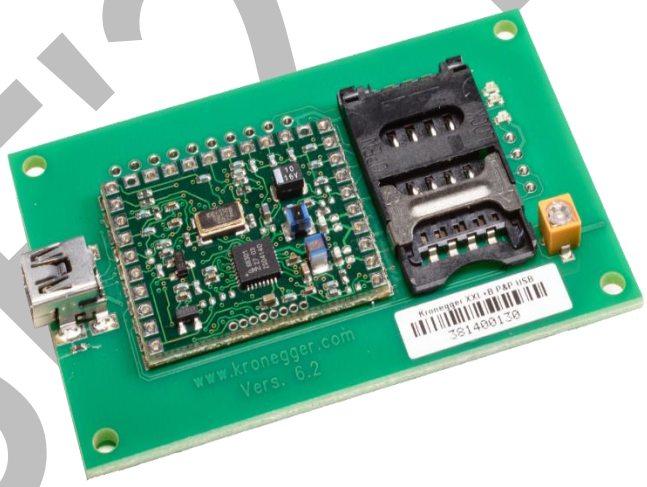

Fig 3: Reader

Fig 4: Tag

NFC reader/writer. Enables NFC- Enabled devices to read information stored on the inexpensive. NFC tags embedded in

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labels are small posters. NFC peer to peer enables to NFC devices to communicate with each other to exchange information in an ad hoc fashion. NFC tag are passive meaning they don't to have any power source instead they literally drop our from the devices that reads them. when a reader gets closed to a tag,it energizes it and transfer data fromNFC transmitter.

IV. SYSTEM ARCHITECTURE

ATMEGA328

The high-performance Atmel 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer /counters with compare modes, internal and external interrupts,serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. By executing powerful instructions in a single clock cycle, the device achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed. The **ATmega328** is a single chip micro-controller created by Atmel and belongs to the megaAVR series.

Fig 5: ATmega328 Microcontroller

The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughputs approaching 1 MIPS. Today the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost micro-controller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno and Arduino Nano models.

The name says it all on this one. An ATmega328 in DIP package, pre-loaded with the Arduino Optiboot (Uno 16MHz) Bootloader. This will allow you to use Arduino code in your custom embedded project without having to use an actual Arduino board. To get this chip working with Arduino IDE, you will need an external 16MHz crystal or resonator, a 5V supply, and a serial connection. If you are not comfortable doing this, we recommend purchasing the Arduino Uno board that has all of these built into the board. Atmel's ATMega328 8-Bit Processor in 28 pin DIP package. It's like the ATmega168, with double the flash space. 32K of program space. 23 I/O lines, 6 of which are channels for the 10-bit ADC. Runs up to 20MHz with external crystal. Package can be programmed in circuit. 1.8V to 5V operating voltage.

PROTEUS

The microcontroller can understand a program written in assembly language, it must be compiled into a language of zeros and ones. Assembly language and Assembler do not have the same meaning. The first one refers to the set of rules used for writing program for the microcontroller, while the later refers to a program on a personal computer used to translate assembly language statements into the language of zeros and ones. A compiled program is also called Machine Code.

In machine code, the same command is represented by a 14-bit array of zeros and ones understandable by the microcontroller. All assembly language commands are similarly compiled into the corresponding array of zeros and ones. A data file used for storing compiled program is called an "executive file", i.e. "HEX data file". The name comes from the hexadecimal presentation of a data file and has a suffix of "hex" as well, for example "probe.hex".

EMBEDDED C

Looking around, we find ourselves to be surrounded by various types of embedded system. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software. If hardware forms the body of an embedded system, embedded processor acts as the brain, and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded systems.

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During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROMs. There used to be no mechanism to find what the program was doing. LEDs, switches, etc. were used to check correct execution of the program. Some 'very fortunate' developers had In-circuit Simulators (ICEs), but they were too costly and were not quite reliable as well.

Embedded C requires compilers to create files to be downloaded to the microcontrollers/microprocessors where it needs to run. Embedded compilers give access to all resources which is not provided in compilers for desktop computer applications.

V. IMPLEMENTATION

Experimental results ofadding product, stack demand, expired product and total product are shown in Figures 6, 7, 8 and 9

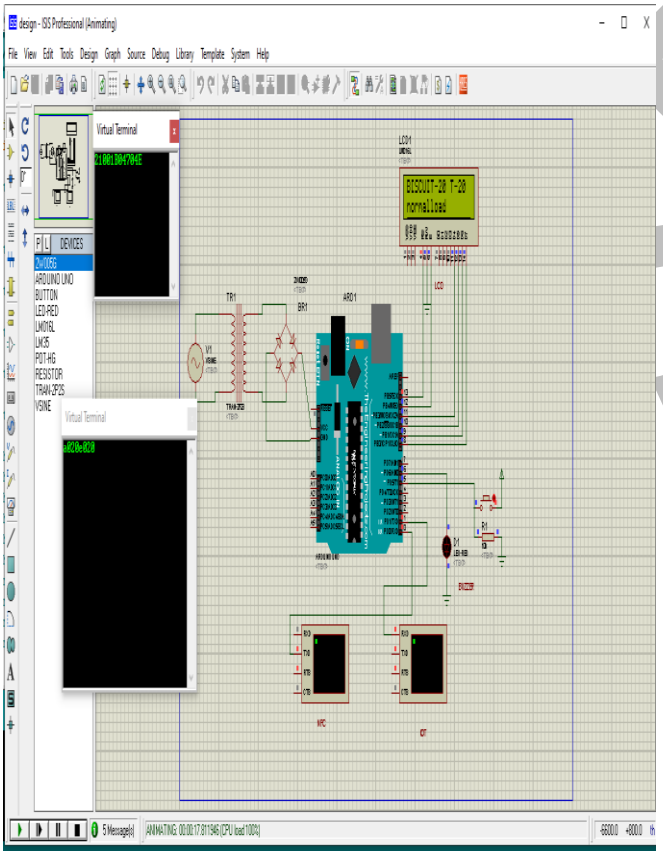

Fig 6: Simulation of adding product

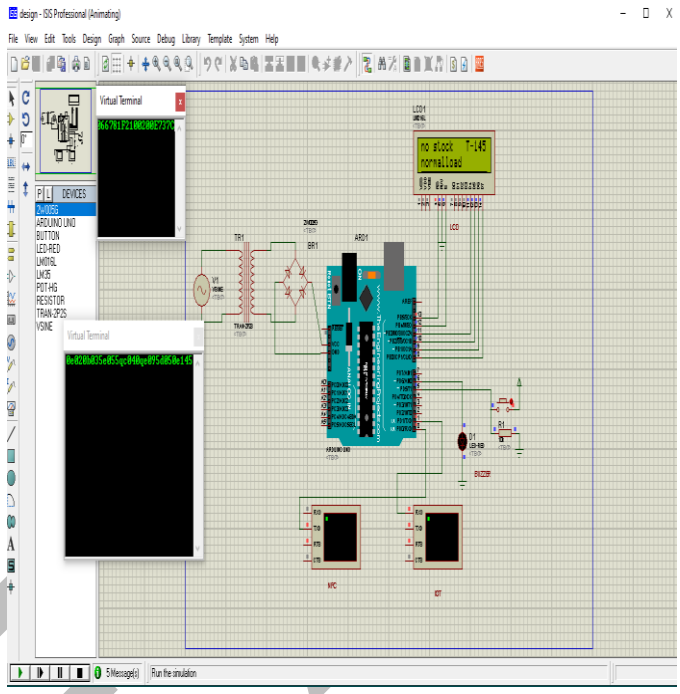

Fig 7: Simulation of expired product

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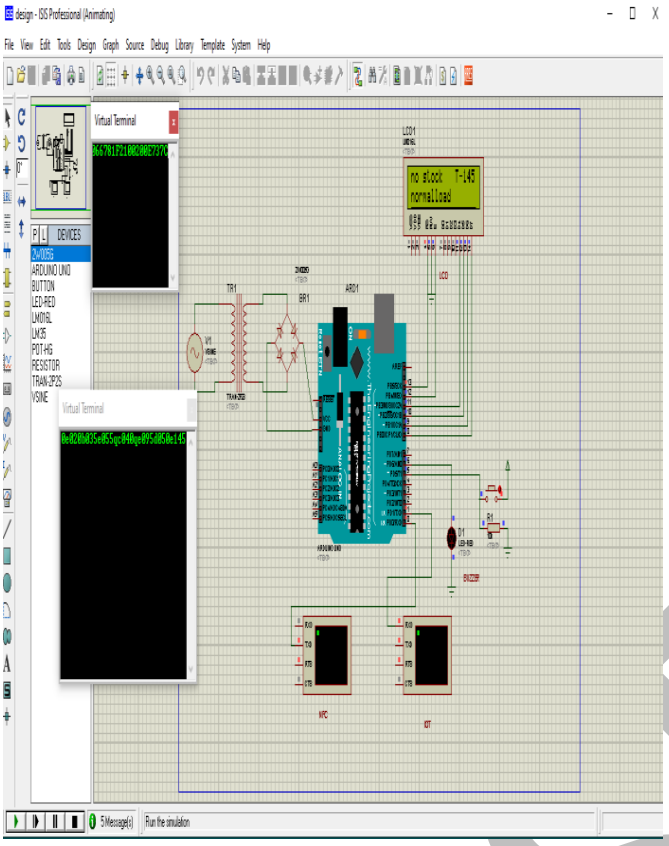

Fig 8: Simulation of stack demand

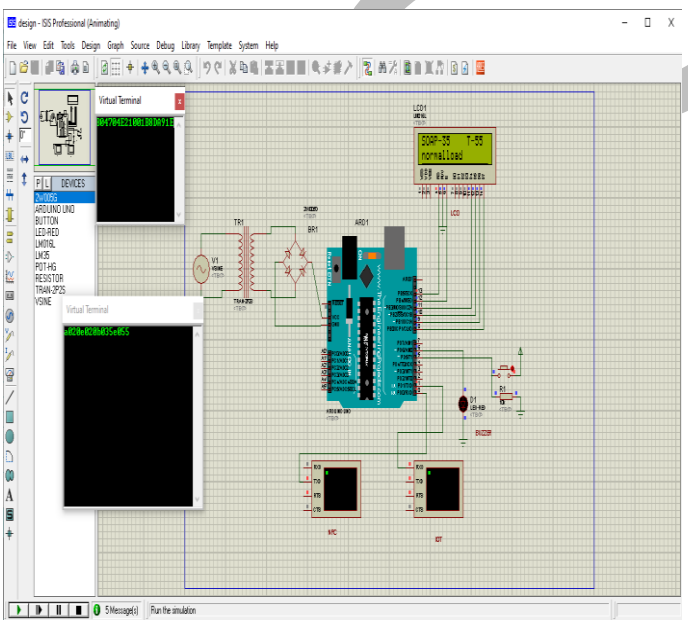

Fig 9: Simulation of total product

VI. CONCLUSION

In this paper, we propose a secure smart shopping system utilizing NFC technology. This is the first time that NFC is employed in enhancing shopping experiences and security issues are discussed in the context of a smart shopping system. We detail the design of a complete system and build a prototype to test its functions. We also design a secure communication protocol and present security analysis and performance evaluations. We believe that future stores will be covered with NFC technology and our research is a pioneering one in the development of a smart shopping system. Our future research will focus on improving the current system, for example, by reducing the computational overhead at the smart cart side for higher efficiency, and how to improve the communication efficiency while preserving security properties.

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