

Smart Cart Based on IoT

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ABSTRACT

In today's life the purchasing and shopping at big malls is becoming daily activity in various cities. There is so much of crowd present at these malls on holidays, weekends and on special discounts days. People purchase different items and put them in cart. When they completed the purchase then they required to go to billing counter for payments. At billing counter the cashier prepare the bill with the help of bar code scanner which is very time consuming process which results into long queue at billing counter. Our aim is to develop a system that can be used to solve the above mentioned problem. In this system, every product in shopping store will have a RFID tag, and every shopping cart will be having RFID reader, LCD display, Microcontroller and Wi-Fi module attached to it.

The use of RFID Reader is to read the RFID tags of all products to define the name and price of the products. Depending on the signal from the RFID reader, the Microcontroller will display the name and price of each product by using the LCD. Also, the total amount of the products in the trolley will be displayed in the android device as most of the people use android phones. Moreover, also there will be RFID reader at the exit door for anti-theft.

INTRODUCTION

The main intention of this project is to improve the quality of shopping experience to the customers. This can be done by simply attaching RFID tags to the products and a RFID reader with a LCD display on the smart shopping cart. This system will give information about the name and cost of items and also, the total amount of bill of shopping items that will be displayed on 16*2 LCD. This system will save time of customers and manpower required in mall and cost associated with the product.

The word shopping can be defined as a group of people who is united at one place for buying the products. The style or pattern of doing shopping has been changed now. If we compared it with the past time, then at that time seller use to take their products and roam here and there selling those products but now this schema has been changed. Markets are developing daily, now everyone wants to save their time and acquire profit while shopping.

There are mainly two different types of shopping formats are present which are (i) Physical Shopping, (ii) Online Shopping.

The term "Physical shopping" means consumer goes physically into malls for buying products. In physical shopping both the buyer and seller are practically present. That's why our aim is to modify the existing cart so that time is reduced during shopping. Our proposed system is based on following four different technologies.

However, the term "Online Shopping" means consumer does shopping via internet, through call or through some application by just clicking. In online shopping both buyer and seller are not interacting physically. From buying the products to paying the bill everything is online.

Keyword: RFID technology, WI-FI module for communication, Android application, Microcontroller, LCD.

LITERATURE SURVEY

Dr. Suryaprasad J in "A Novel Low-Cost Intelligent Shopping Cart" proposed to develop a low-cost intelligent shopping aid that assists the customer to search and select products and inform the customer on any special deals available on the products as they move around in the shopping complex.

Amine Karmouche in "Aisle-level Scanning for Pervasive RFID-based Shopping Applications" proposed to develop a system that is able to scan dynamic and static products in the shopping space using RFID Reader antennas. Instead of conducting the RFID observations at the level of individual carts, aisle-level scanning is performed.

Satish Kamble in "Developing a Multitasking Shopping Trolley Based on RFID Technology" proposed to develop a product to assist a person in everyday shopping in terms of reduced time spent while purchasing. The main aim of system is to provide a technology oriented, low-cost, easily scalable, and rugged system for assisting shopping in person.

Mr. P. Chandrasekar in "Smart Shopping Cart with Automatic billing System through RFID and ZigBee" proposed to develop a shopping cart with a Product Identification Device (PID) which will contain a microcontroller, a LCD, an RFID reader, EEPROM, and ZigBee module. Purchasing product information will be read through a RFID reader on shopping cart.

Existing Model

- Manual billing.
- Use barcode for billing
- human staff is needed for billing
- Low product cost but overall expenses are much high.
- Difficult to track the product.
- Getting product information is difficult & time consuming.
- It does not disclose any automatic way of indicating to the shopper how the total bill is affected as objects are added or removed from the cart.

Proposed Model Smart Cart Based on IOT

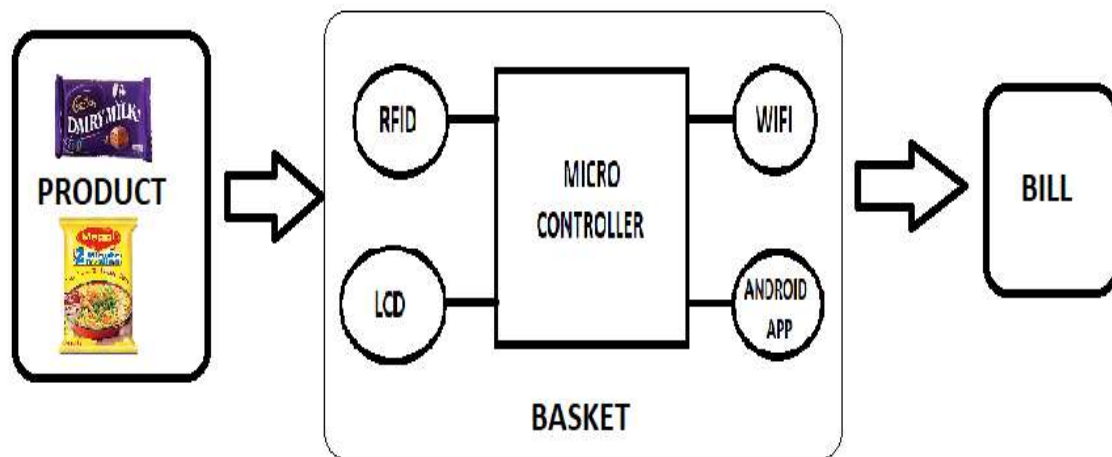


Fig 1.0: Block Diagram of Smart Cart

HARDWARE USED

I. ARDUINO NANO

In Fig 1.0, the microcontroller used for this project is Arduino Nano. The Arduino Nano is a microcontroller board, which contains on-board power supply, USB port to communicate with PC, and an Atmel microcontroller chip.

It simplifies the process of creating any control system by providing the standard board that can be programmed and connected to the system without the need to any sophisticated PCB design and implementation.

It is open source hardware; anyone can get the details of its design and modify it or make his own one himself.

Microcontroller is a micro-computer. As any computer it has internal CPU, RAM, and IOs interface. It is used for control purposes, and for data analysis. The famous microcontroller manufacturers are Microchip, Atmel, Intel, Analog devices, and more.

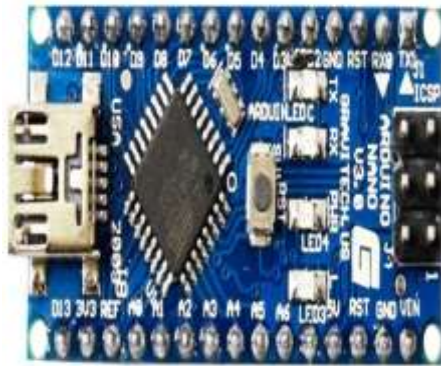


Fig 1.1: Arduino Nano

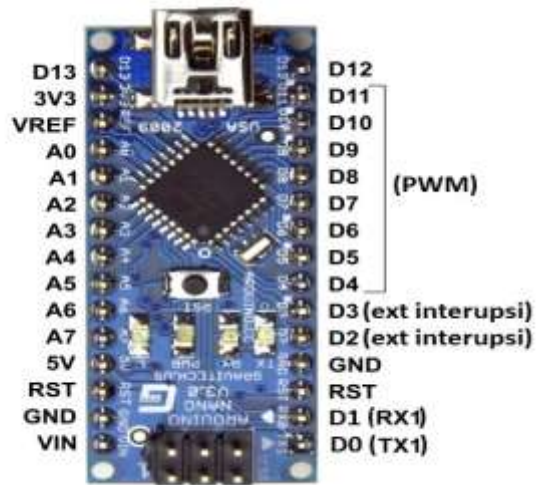


Fig 1.1 Arduino Nano Pin Layout

Table: 1 Pin description of Arduino Nano

Pin No.	Name	Type	Description
1-2, 5-16	D0-D13	I/O	Digital input/output port 0 to 13
3, 28	RESET	Input	Reset (active low)
4, 29	GND	PWR	Supply ground
17	3V3	Output	+3.3V output (from FTDI)
18	AREF	Input	ADC reference
19-26	A7-A0	Input	Analog input channel 0 to 7
27	+5V	Output or Input	+5V output (from on-board regulator) or +5V (input from external power supply)
30	VIN	PWR	Supply voltage

II. ATEMAGA- 328

Fig 1.2 Atmega328 is a single-chip microcontroller created by Atmel in the mega AVR family. 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 throughput approaching 1 MIPS per MHz.



Fig 1.2: ATEMAGA- 328

III. LCD 16x2

Fig 1.3 a liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals.

- Liquid crystals do not emit light directly.
- 16x2 LCD has 2 horizontal line which comprising a space of 16 displaying character.



Fig 1.3: LCD 16x2

IV. WIFI MODULE

Fig 1.4, ESP8266 has 8 pins, 4 in the row of 2. The first pin on the top left is GND. The two pins right from the GND are GPIO 2 and 0. I'm not going to use these pins, as they are not important for the operation. The pin on the top right side is the RX pin and the pin on the lower left is TX. These are the pins for communication. The middle pins on the bottom are CH_PD (chip power-down) and RST (reset)



Fig 1.4: WIFI MODULE

V. RFID

Fig 1.5, Radio frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag. It is attached to an object, through a reader for the purpose of identifying and tracking the object. RFID tags can be either passive, active or battery assisted passive. Passive RFID does not use a battery; while an active has an on board battery that always broadcasts or becomes its signal.



Fig 1.5: RFID

CONCLUSION

By means of this paper intent to simplify the billing process, make it swift and increase the security using RFID technique. This will take the overall shopping experience to a different level. Different parameters such as the system parameters of smart trolley like products name, products cost, product weight etc. are continuously display. Thus with the help of the conclusion we can say that Automatic billing of products by using RFID technique will be a more viable option in the future and the system based on RFID technique is efficient, compact and shows promising performance.

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