VISVESVARAYA TECHNOLOGICAL UNIVERSITY

MINI PROJECT REPORT ON

"SMART SHOPPING CART USING ARDUINO"

SUBMITTED BY:

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CERTIFICATE

Certified that the mini project work entitled "**SMART SHOPPING CART USING ARDUINO**" carried out by **G.Saranya(1NH18EC036)** bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

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Name of Examiner   Signature with Date

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ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

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CHAPTER 1

INTRODUCTION

We have seen that the long queues in super markets are much time consuming.costumers do face problems by thinking their money investment for buying the products or investing their time for billing or as getting the actual price of the product and so on.

Presently,the the shopping system used in shopping malls is the Barcode system. This system has replaced the previous manual system but still has some limitations. Barcode system requires the bar code on each and every product and is done with the help of barcode scanner. But this barcode scanner can scan items only upto a few inches.Barcodes are read only type and cant be overwritten. If any damage to the code of the product ,it is difficult to scan the product through the bar code scanner .The barcode system works on optical technology i.e, laser technology. Still, in order to scan the products in the shopping malls we require man power and human effort as well. In addition to this ,we the customers still stand in the queue for billing purpose which is tiresome and risky. Thus it is much obvious to use smarter and efficient system to have a healthy shopping environment.

Smart shopping cart using Arduino and RFID is a new advancement in this field. This system not only erdicates the long queues in super markets but saves a lot of time and human efforts . The system uses RFID tags in the place of barcode which is much efficient and powerful when comes for scanning of the products. The device developed using Arduino and RFID shall be installed in the cart . As a result the customers themselves can scan the products by avoiding long queues.


smart

CHAPTER 2

LITERATURE SURVEY:

In this chapter research is done prior taking up the project and understanding the various methods that were used previously.Analysis of the existing is done.

RFID & Barcode Processing

RFID and barcodes are similar in the way that they are used in data collection technologies, which means they used to automate the process of data collection. However, they do differ significantly in many areas. If compared, RFID technology is found to be much more simpler than barcode technology. Barcode scanner requires " line of sight "whereas RFID can be read without the line of sight. It is possible to scan RFID tags from a larger distance(inches). RFID reader can gain the information of the tag from a distance of about 300 feet, whereas barcode technology cannot be scanned from a distance of more than 15 feet. Barcode coded items can only be read individually, whereas multiple tags can be read at a time by using RFID reader simultaneously.

RFID technology is better than barcode technology in terms of speed. RFID tags can be read much faster than the barcode tags. As it requires a direct line of sight, barcode reading is comparatively slower than the RFID tag reading.

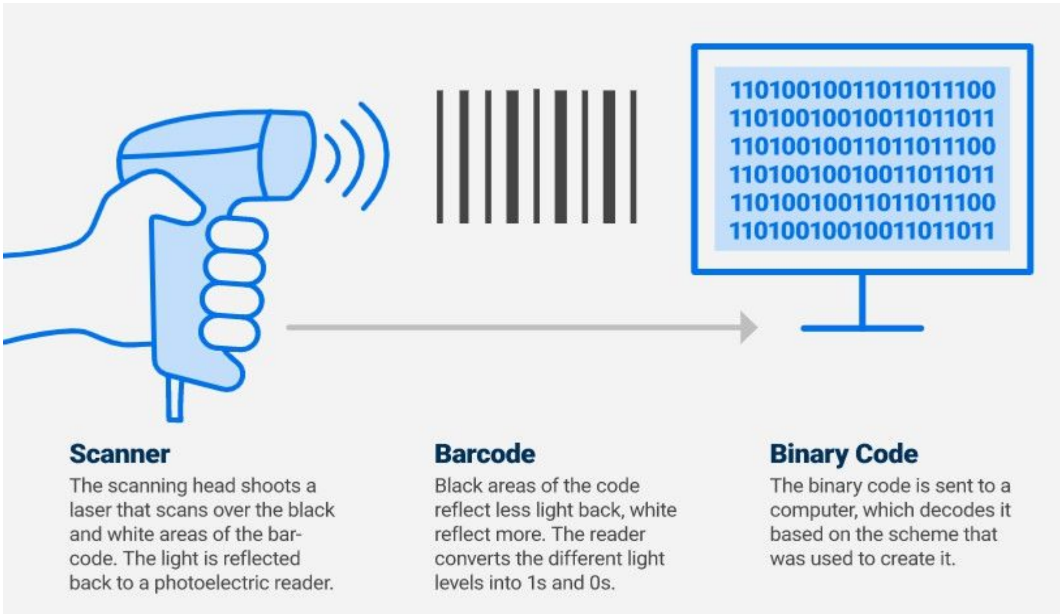


Fig 2.1 : barcode process

RFID & Barcode Approaches

A barcode reader takes about one second to successfully interpret two tags, whereas at the same time the RFID reader can interpret around 40 tags. RFID tags are well protected and implanted inside the product, and thus they are not subjected to too many wears and tears. As a result the tag stays safe for a longer time .The barcode requires a direct line of sight to read the printed barcode, because of which the barcode has to be printed on the outer side of product, thus subjected to huge amounts of wears and tears. It is also limited to the re-utilization of the barcodes. As barcode lacks with the read and write facility, it is not possible to add to the information which is existing on it. The main advantage of using the RFID tags is that rewriting on RFID tags is possible.

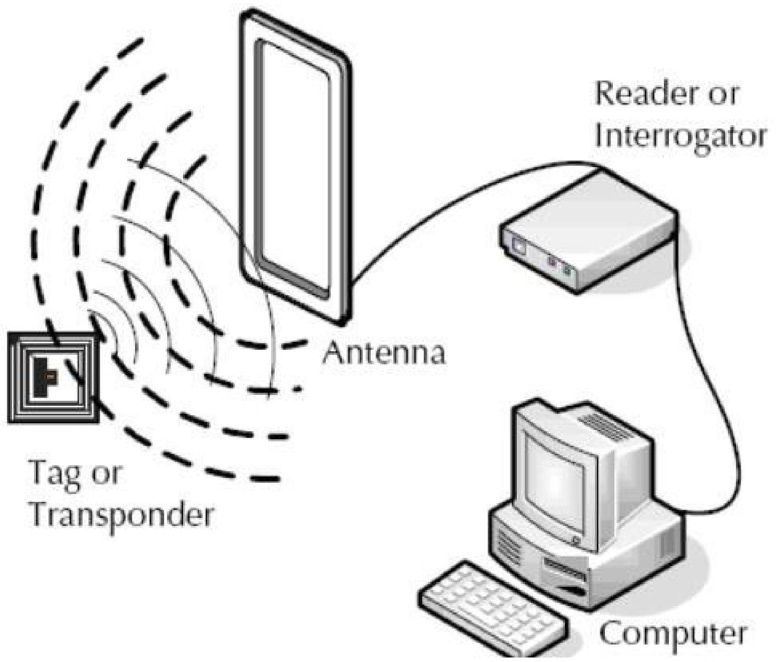


Fig 2.2: rfid tag process

Analysis

The utility of trolley will be first one of its kind in the commercial use. This device records and reads the data of different products with the help of the suitable sensors like RFID tags. This recorded data helps the shop owner with the detailed analysis of shopping by the customer & their preferences through computer; printout of the same can be obtained. In Automatic trolley, there is no need to pull heavy trolley, wait in billing queue and thinking about budget. The microcontroller or arduino based trolley will automatically follow the customer. And also it maintains the safe distance between the customer and itself. It gives number of products in trolley and the total cost of the products on the spot.

CHAPTER 3

PROPOSED METHODOLOGY

PROBLEM STATEMENT:

In shopping malls ,billing of the products is done through barcodesusing barcode scanning. This makes the customers to wait in a queue for billing their products. Here we opt for a system which helps the customers to bill by themselves by avoiding so called long queues.

OBJECTIVES:

- To avoid standing of customers in long queues for billing .
- To use RFID tags in the place of barcodes for better scanning
- To implement a system which can scan and bill by the customers itself without depending on manpower for doing it.
- Can add and delete the item easily according to the customer requirement.

PRINCIPLE :

The major part of this project is scanning of rfid tags.Rfid tags works on the following principle: When a rfid tag comes in the proximity of rfid reader the tag detects the reader signal through a coil present in it which converts the received RF signal into electrical signal. This is transmitted to arduino nano and thereby displayed on the lcd.

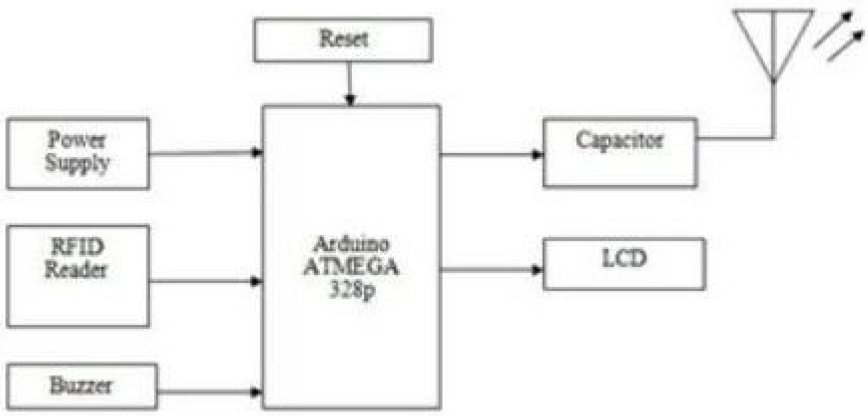


Fig 3.1 : reading of data

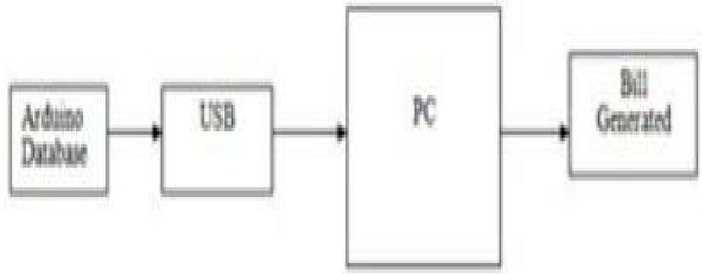


Fig 3.2:billing part

➢ **<u>FLOW OF PROJECT:</u>**

- Rfid reader reads the rfid tag and gives the indication of beep using buzzer then it is given to arduino .Arduino initially works in SPI mode and then I2C mode and finally data is transformed to led display having I2c module interfaced to it.
- The second flowchart indicates that the arduino is compiled with the help of arduino IDE and is connecyed to the hardware by mini USB cable .after all the hardware wortk again the rfesult is transferred to the PC which results in the final result on the lcd to generate a bill.

WORKING:

Smart shopping cart is a project which is basically operated at 5v by using mini USB cable.This project mainly works by the scanning of rfid tags using rfid module and data is received by the arduino nano.

The circuit can be divided mainly into 4 parts,i.e.,

1. Arduino in SPI mode
2. Scanning of rfid tag
3. Arduino in I2C mode
4. Display on lcd

Here arduino is tend to operate as arduino nano as we only for short distances.

➢ After the power is supplied inorder to activate the circuit ,push the push button
➢ Now ,rfid tag is read by using rfid reader . Here rfid reader reads the information in the card and transmitts it to the arduino through TX to RX pin of arduino.
➢ When it gets activated ,initailly arduino is tend to operate in SPI mode which means that the data can be received and sent simulatneously.

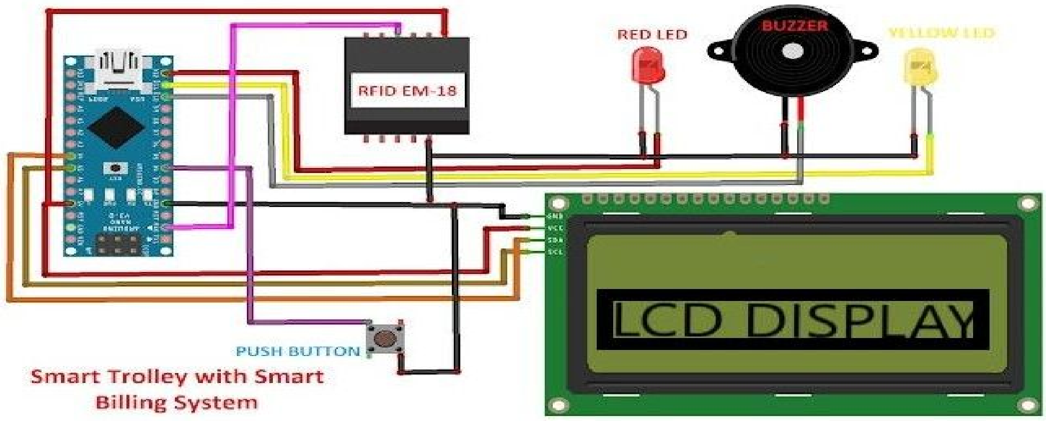


Fig 3.3: circuit diagram

- When the card is scanned ,the buzzer beeps indicating the card is scanned and the blinking of LED's indicate the eithe addition or deletion of the product.
- MISO means master in slave out indicating the addition of product which blinks the red LED
- MOSI means master out slave in indicating the delete of the product which blinks the yellow LED.
- Later the arduino is tend to operate in I2C mode in which two the data is transferred as bit by bit serially.
- As 16*2 lcd display is interfaced with I2C module the analaog pins of arduino A4(SDA),A5(SCL) are connected to the LCD display for the display of the information like addition or deletion of product,price and item name.
- Accordingly the arduino is written and output i.e.,final cost is dispalyed on the lcd screen.

CHAPTER 4

PROJECT DESCRIPTION

Hardware components:

1) Arduino nano
2) Em 18 rfid reader module
3) Rfid tags
4) I2C module
5) 16*2 lcd display
6) 2 leds
7) buzzer

1. ARDUINO NANO:

Arduino nano is a simple,complete ,small ,compatible and breadboard friendly microcontroller board developed by Arduino.cc based on the Atmega 328p .It works with mini USB to power the arduino board. Arduino nano has 14 digital pins and 8 analog pins,2 reset pins and 6 power pins. The digital pins can be used as both input and output accordingly whereas analog pins are only input.These pins acts as input when they are connected to sensors and acts as output pins when they are driven by load . The pin diagram of arduino nano is given as

No.	Pin Number	Pin Description
1	D0 - D13	Digital Input / Output Pins.
2	A0 - A7	Analog Input / Output Pins.
3	Pin # 3, 5, 6, 9, 11	Pulse Width Modulation (PWM) Pins.
4	Pin # 0 (RX) , Pin # 1 (TX)	Serial Communication Pins.
5	Pin # 10, 11, 12, 13	SPI Communication Pins.
6	Pin # A4, A5	I2C Communication Pins.
7	Pin # 13	Built-In LED for Testing.
8	D2 & D3	External Interrupt Pins.

Fig 4.1:pin description

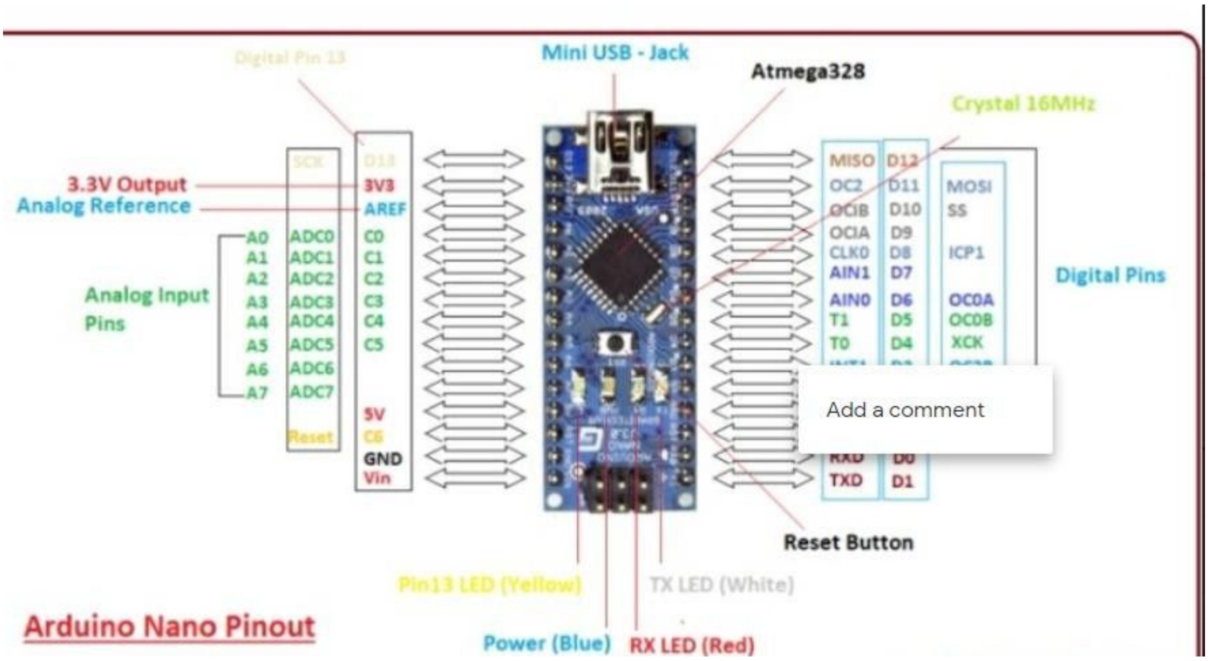


Fig 4.2 :arduino pin layout

Pin description:

1) Vin:

It is a input power supply voltage to the board while using external power of 7 to 12v

2) 5V :

It is a regulated power supply volatge of a board that is regularly used to power controller and other components.

3) 3.3V:

This is the minimum volatge regulated by the voltage regulator

4)Gnd:

There are multiple ground pins on the board .These are the reference Pins.

5) reset:

This is used to reset the board.This is very helpful while running the complex programs.Low value of reset will reset the microcontroller.

6) Analog pins:

There are 8 analog pins on the board A0-A7. These pins are used to measure the analog voltage ranging 0-5v.

7) Rx,Tx:

These pins are used for serial communication where Tx is for transmission

and Rx is for receiving the data.

8) AREF: used as a reference voltage

9)PWM:

Six pins 3,5,9,6,10,11 can be used to provide 8-bit PWM(pulse width

Modulation) output.It is a method of getting analog results from digital data.

10) SPI:

4 PINS 10(SS),11(MOSI),12(MISO),13(SCK) are used for SPI(serial peripheral interface).It is mainly used to transfer data between microcontrollers and others like sensors,registers etc.,

11) I2C:

I2C communication is developed by using A4 and A5 analog pins where A4 pin represents the serial data line (SDA) which carries the data and A5 pin represents the seial clock line (SCL) which is a clock signal,generated by the master device,which is used for data synchronization between the devices on an I2C bus.`

12) External interrupts:

Pin 2 and 3 are the external interrupts which is used to call the important instruction immediately.

ARDUINO NANO TECHNICAL SPECIFICATIONS:

- It is programmed using arduino IDE which is an integrated development environment that runs the code
- Arduino nano has an oscillating frequency of 16MHz.used to provide clock of precise frequency using constant voltage.
- Functions like pinMode() and digitalWrite()are used to control the opeartions of digital pins and analogRead() is used to control the analog pins.

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage for Vin pin	7-12V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (2 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz
Communication	IIC, SPI, USART

Fig 4.3:arduino specifications

COMMUNICATION AND PROGRAMMING OF ARDUINO NANO:

1) Nano devices comes with an ability to set up communication with other controllers and computers.The serail communication is carried by the digital pins like pin 0 (Rx) and pin 1 (Tx) which functions as receiving and transmitting the data.
2) The Tx and Rx pins come with an LED which blinks when the data is transmitted.
3) Arduino Software Serial Library is used tpo carry out serial communication between the load and computer.
4) Apart from serial communication ,it also supports both I2Cand SPI communication .Wire Library inside the arduino software is accessed to use the I2C bus.

Difference between arduino UNO and NANO:

- Both arduino UNO and arduino NANO come with similar functionality with a little difference in terms of PCB layout,size and form factor.
- Arduino UNO is a microcontroller board based on Atmega 328 and has 14 digital pins out of which 6 are PWM pins.It has 6 analog pins interfacced on the board.This board has power jack,16MHz oscillator,reset button and ICSP header.No extra peripheral is required.It is a complete ready to use that requires no prior technical skills to get on hands-on expereience.Arduino UNO can be powered by using DC power jack,battery or simple plug to the computer using USB cable.
- Arduino Nano is small and compact when compared to Arduino UNO.It doesnot have DC power jack and comesw ith Mini USBinstead of regular USB.Nano has 2 extra analog pins than UNO.Nano is breadboard friendly whereas UNO lacks this nature.However both devices run at5V,40mA and 16MHz frequency.

Name	Arduino Nano	Arduino Uno
MCU	Atmega328p/Atmega 168.	Atmega328p
Power	5V	5V
Input Voltage	7 -12 V	7 – 12 V
Maximum Current Rating	40mA	40mA
Clock Frequency	16MHz	16MHz
Flash Memory	16KB/32KB	32KB
USB	Mini	Standard
USART	Yes	Yes
SRAM	1KB/2KB	2KB
PWM	6 out of 14 digital pins	6 out of 14 digital pins
GPIO	14	14
Analog Pins	8	6
EEPROM	512bytes/1KB	1KB

Difference between Arduino Uno and Arduino Nano

Fig 4.4:difference between arduino nano and uno

FULL DUPLEX MODE COMMUNICATION:

In full duplex mode of communication,transmission is simultaneously bi-directional.The end devices can transmit and receive simultaneously.

SPI Communication in Arduino NANO:

- Serial peripheral Interface(SPI) is a serial communication interface used primarily for short distance communication.This was developed by Mortola in the mid 1980s.
- SPI devices communicate in a full duplex mode using a master -slave architecture with a single master.Master device originates the frame of reading and writing.Multiple slave devices are supported through SS(slave select) line.

INTERFACE:

SPI bus specifies 4 logic signals

1)SCLK: Serial Clock (output from master)

2)MOSI:Master Out Slave In (data output from master)

3)MISO:Master In Slave Out (data output from slave)

4) SS:Slave Select (often active low,output from master)

The pins of master are connected to slave of same type.

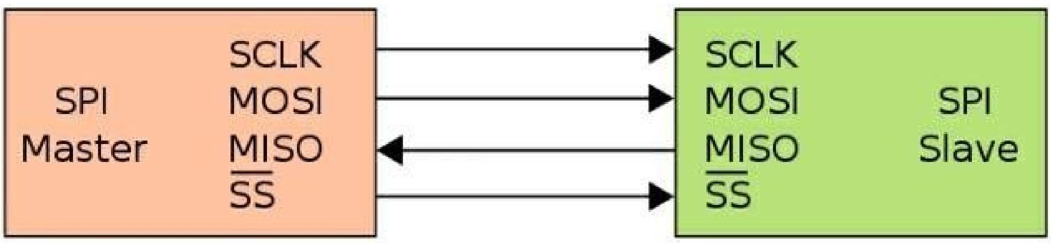


Fig 4.5: SPI master slave

OPERATION:

If a single slave device is used ,the SS pin is fixed to logic low if the slave permits.

To begin communication,the bus master configures the clock,using the frequency supported by slave deviceupto few MHz.If a waiting period is required ,such a s analog-digital conversion,master must wait for at least that period of time before issuing clock cycles.

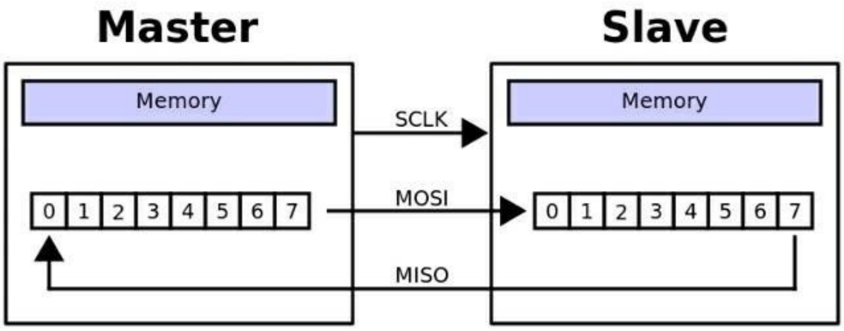


Fig 4.6: data transfer between master slave

SPI is a synchronous bus means that it has separate lines for datya and clock.The clock is an oscillating signal that tells the receiver exactly when to sample the bits on the data line.SPI is so popular that the receiving hardware is a simple shift register.

During each SPI clock cycle,a full duplex data transmission occurs.Master sends a bit on MOSI line and slave reads it ,while slave sends a bit on MISO line and the master reads it.This sequence is maintained even when only one -directional data transfer intended.

Transmisssion normally involve two shift registers of some given word-sizei,e.,8 bits one in master and other in slave.data is usually shifted out with the most significant bit first.Transmission may continue for any number of cycles.when complete thec master stops toggling the clock signal and typically deselects the slave.

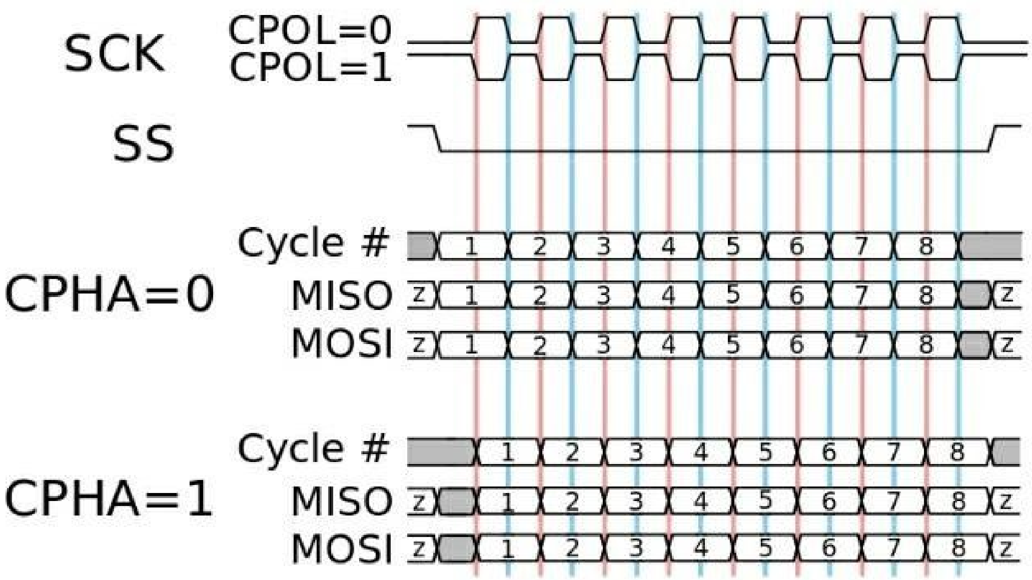


Fig 4.7: clock pulse in SPI

HALF DUPLEX MODE COMMUNICATION:

In half duplex communication, devices can only transmit in one direction.With half duplex ,data can move in two ways but not at a same time.

I2C COMMUNICATION:

I2C is a synchronous serial communication protocol,which communicates in half duplex mode so data is transferred bit by bit along a single wire .The I2C protocol involves using two lines to send and receive the data:a serial clock pin(SCL) that the arduino master board pulses at a regular interval,and a serail data pin(SDA) over which data is sent between the two devices.

Working:

With I2C data is transferred in messages.meassages are broken up into frames of data.As the clock changes from low to high ,a single bit of information ;that will form a sequence of address of a specific device or command.

I2C bus has just two wires SDA and SCL. The data to be transferred is sent through SDA wire and is synchronised with the clock signal SCL.I2C network is shown below

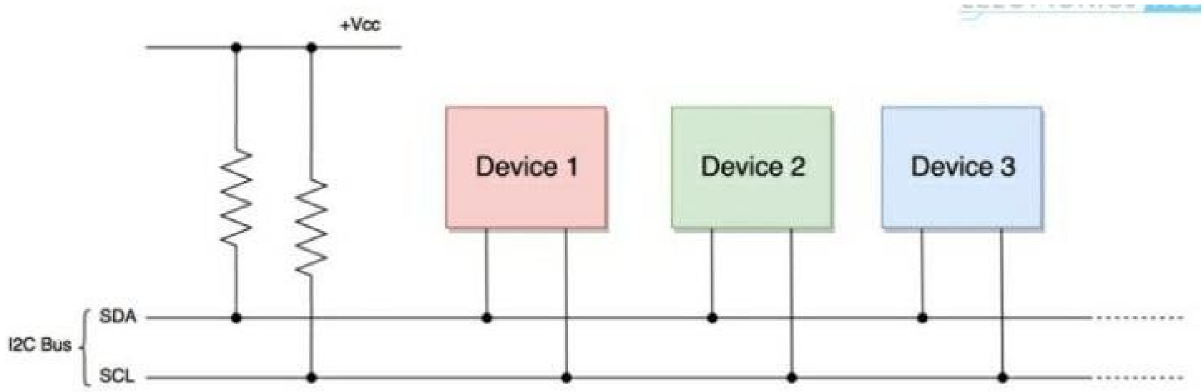


Fig 4.8: I2C bus

Both the I@C bus lines(SDA,SCL) areb operated as open drain drivers.which means that any device/IC on the I2C network can drive both SDA and SCL low but not high.so there is a necessity of pull up resistor.If we use open drain system there will be no chance of shorting. Only one master is active and it controls the SCL clock line and decides the type of operation to be done on SDA line.

START CONDITION:

When the master device decides to start the transaction ,it switches the SDA line from high voltgae to low voltage level before the SCL line switches from high to low.

STOP CONDITION:

After required data blocks are transferred through SDA line, the master device switches the Sda line from low voltage level to high voltage level before SCL line switches from hight to low level.

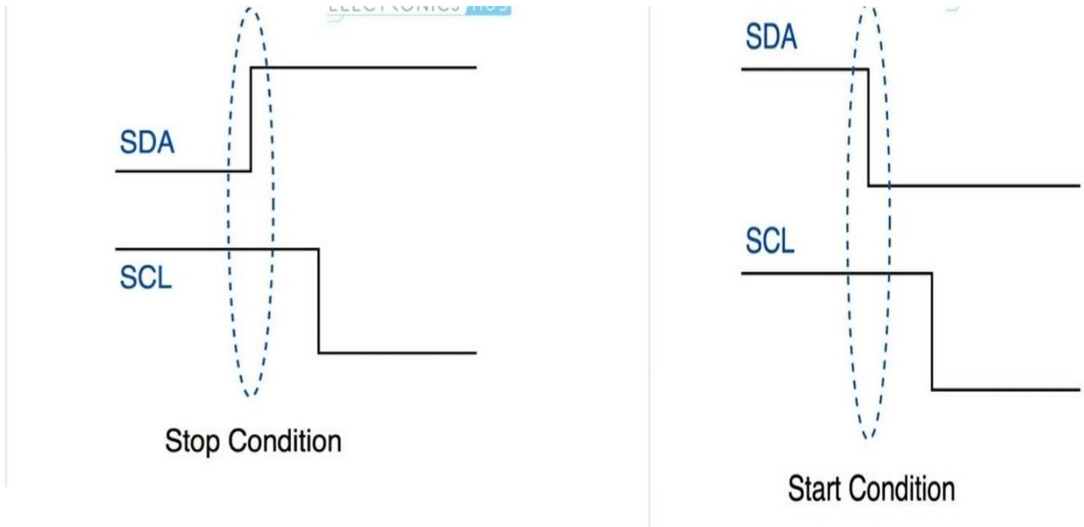


Fig 4.9:initial and final clock pulse

Here in our circuit we use both SPI and I2C communications inorder to avoid the rising and falling levels of clock in SPI communication.moreover SCL and SDA donot change drastically thus the clock of I2C alone is enough to run the circuit of both communications**.**

Applications:

1) Arduino metal detection and real time face detection
2) Medical instruments
3) Android and GSM based applications
4) Embedded sysytems
5) Automation and robotics

2. EM 18 RFID READER MODULE:

EM 18 RFID reader is one of the commonly used rfid reader to read 125 KHz tags. General pin diagram of module is given below.

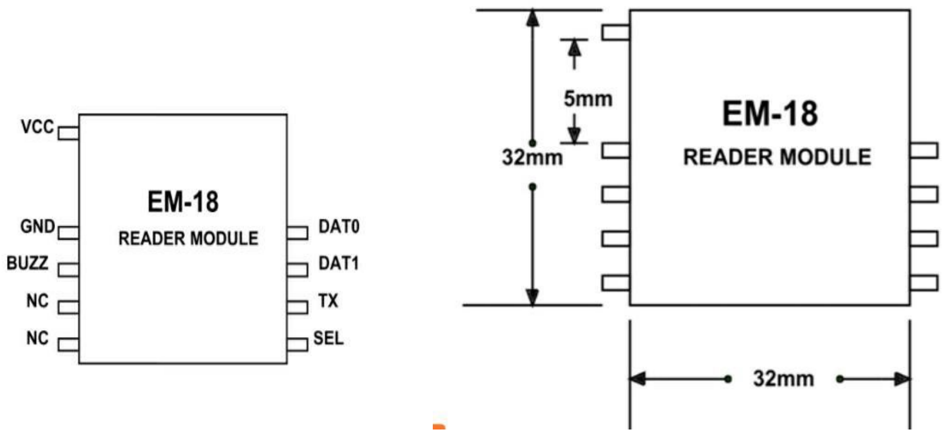


Fig 4.10: schematic of EM 18

Features and specifications of reader module:

- Operating voltage of EM 18 is +4.5 to +5.5V
- Current consumption is 50mA
- Can also operate at LOW power
- Operating temperature is 0°C to +80°C
- Operating frequency is 125KHz
- Communication parameter is 9600bps
- Reading distance is 10cm (max)
- Integrated antenna

VCC	Should be connected to positive of power source.
GND	Should be connected to ground.
BUZZ	Should be connected to BUZZER
NC	No Connection
NC	No Connection
SEL	SEL=1 then o/p =RS232 SEL=0then o/p=WEIGAND
TX	DATA is given out through TX of RS232
DATA1	WEIGAND interface DATA HIGH pin
DATA0	WEIGAND interface DATA LOW pin

Fig 4.11: pin specification of EM 18

USAGE:

EM-18 is used like any othersensor module.Initially we choose the mode of communication between module and controller.later ewe program the controller to receive the data from module to display later power the system.when the tag is brought near the module it reads the ID and sends the information to the controller.

EM 18 can provide output through communication interafce.one is RS232 and the other isWEIGAND.Here we use it in RS232 mode ,thus SEL pin is tend to be high .The output module bit rate is 9600bps.The controller has to be programmed to receiveinformation from module at this rate.simple EM 18 circuit is given below

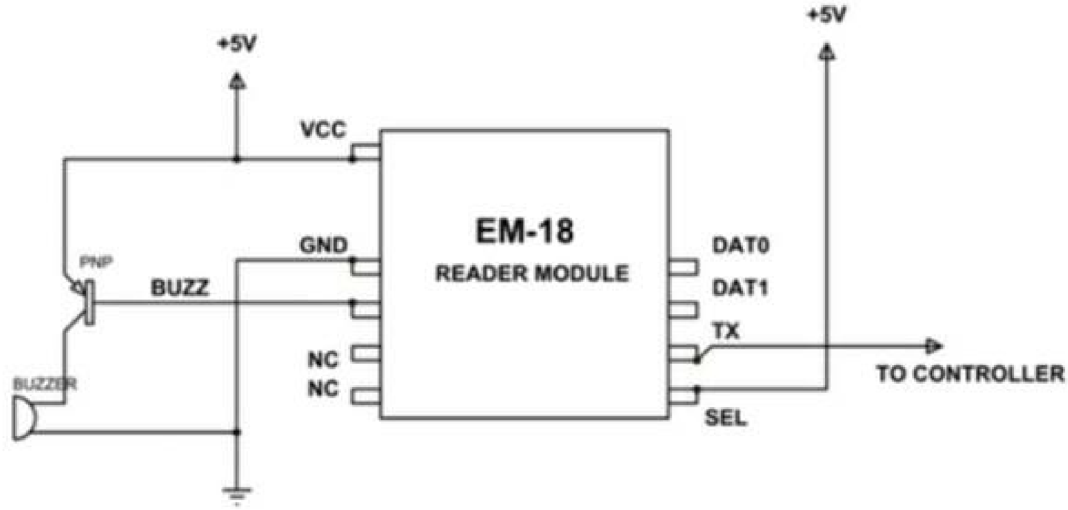


Fig 4.12:integrated buzzer to EM 18

In the above circuit buzzer is not compulsory.When a tag is read the buzzer turns ON.As given in the circuit Tx is connected to the controller which is to receive the data.consider a tag is brought near the reader module.Module reads the ID and sends the information to the controllerin the form of 12 ASCII characters.In them 10 characters represent the tagID and 2 characters are xorof previous 10 characters.

Therefore ,data sent=10 ASCII data(tag no) +2 ASCII data (xor result)

Once the informationis sent ,the module stop sending the data and this serial data is received by the Rx pin of the controller (arduino in our circuit).

The reader converts the radio waves to a morew usable form of data.

APPLICATIONS:

1) Robotics
2) Security systems
3) Computer peripherals
4) Medical tags
5) Unique identity like data authorization

3)RFID TAGS:

RFID tags are a type of tracking system that usessmart barcodes to identify the items.RFID is “Radio Frequency Identification” as such RFID tags utilize the radio frequency technology. These radio waves transmit data from the tag to the reader which then transmits the information to an RFID computer program.

WORKING:

An RFID tag works by **transmitting and receiving information** via antenna and a microchip-also called as an integrated circuit.RFID belongs to a group of technologies referred to as Automatic Identification and Data Capture(AIDC).These directly reads the data into computer with or without human intervention. RFId methods utilize radio waves.There are two major types of RFID tags: 1) battery operated and 2) passive .As the name suggests battery operatedRFID tags contain onboard battery as power supply. And the passive RFID tag does not have .Instead working by using electromagnetic energy transmitted from an RFID reader. Battery operated RFID tags are also called as active RFID tags.

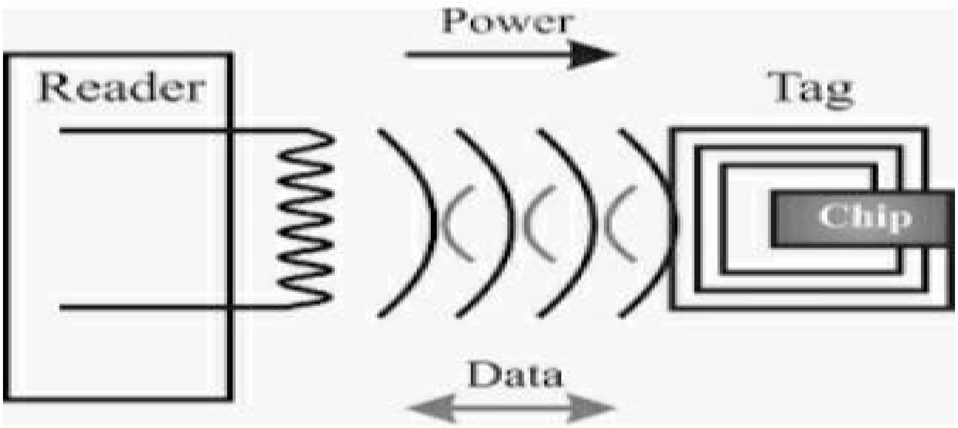


Fig 4.13 : RFID processing

PASSIVE RFID TAGS:

When a passive RFID tag is scanned by a reader , the reader transmits energy to the tag which powers it enough for the chip and antenna to relay information back to the reader. Reader then transmits the information back to an RFID computer program to interpret.There are two main types of passive RFID tags:inlays and hard tags. Inlays are typically quite thin and chance of strucking on materials ,whereas hard tags are hard,durable material .We use passive tags at a fequency of 125MHz.

ACTIVE RFID TAGS:

Active RFID tags require higher frequency than passive tags i.e.,433MHz or 915MHz to transmit information.It has three main parts ,comtaining tag,antenna and interrogator.The battery in an active RFID tag should supply enough power .These are in much higher applications.

RFID Applications:

- Supply chain management
- Inventory management

- Personnel and asset tracking
- Pharmaceutical industry

4) 16*2 LCD DISPLAY WITH I2C MODULE:

I2C module has an inbuilt I2C chip that converts I2C serial data to parallel data for the LCD display.These modules are currently supplied with a default I2C address of either 0x27 or 0x3F.Here in our project we use 0x27 where there are no pads .

Fig 4.14:I2C layout

With this module ,you can control an LCD display using only two pins of arduino :the analog input pin 4(SDA) and the analog input pin 5 (SCL) forming the I2C interface.In the I2C module structure in the left side we have 4 pins, two for power (Vcc and ground) ,and the other two are I2C interface (SDA and SCL).By default the module is configured with the address of 0x27.

Here inorder to transmit the data ,I2C module is interfaced with the 16*2 LCD display.

The ground and Vcc of I2C is connected to similar pins of the arduino .And the other pins SDA and SCL are connected to the arduino inorder to display the I2C communication protocol.

16*2 LCD DISPLAY:

16*2 LCD means it has 16 columns and 2 rows.Thus in total it has 32 characters in total and each character is made with 5*8 pixel dots.Therefore 16*2 Lcd has of 1280 pixels .Inorder to handle all these pixels ,this LCD display is interfaced with some sort of IC's to control the functionality . Here in our circuit ,it is interfaced with I2C module.

Fig 4.15: Lcd display with pin layout

FEATURES:

- Operating voltage of 4.7V -5.3v
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module means can display both alphabets and numbers.
- Consists of 2 rows
- Has 2 LED's
- It is used to either read or write the data.

SOFTWARE SPECIFICATIONS:

- Digital I/O
  digitalRead()
  digitalWrite()
  pinMode()
- Analog I/O
  analogRead()
  analogWrite()

➢ The pinMode () function is used to configure a specific pin to behave either as an input or an output.
  Syntax: pinMode(pin,mode)
  Pins configured as output with this command are said to be in a low impedence state.This provides approximately 40mA of current which helps in blinking of LED's.

- The digitalWrite() function is used to write a HIGh or LOW value to a digital pin.If the pin is configured as OUTPUT in pinMode() ,its voltage will be set to 5V for high and 0V for low.If the pin is configured as INPUT ,digitalWrite() will enable or disable the internal pull-up on the input pin.
  Syntax:digitalWrite(pin,value)
  Where value-HIGH or LOW
- The analogRead() function is used to read the voltage applied to the "analog in " pins of arduino nano which are located at the lower-right part .These are 6 in number.This function returns the number in between 0 and 1023 which represents the voltage of 0-5V
  Syntax :analogRead(pin)
  Pin-the no of the analog input pin to read from(0 to 7 on nano board)

Here in our project we use two types of code for obtaining the final result.

1) For finding the 12 digit RFID tag number
2) For obtaining the total price of the products.

Code for getting the RFID 12 digit number:

```
int count = 0;

char card_no[12];

void setup()

{

  Serial.begin(9600);

}


void loop()

{

  if(Serial.available())

  {

    count = 0;

    while(Serial.available() && count < 12)

    {

      card_no[count] = Serial.read();

      count++;

      delay(5);

    }
```

```
  serial.print(card_no);
 }
}
```

i

Code for finding the output i.e.,total price

Initially we fing the RFID tag number and then we write a code accordingly using if-else logic for obtaining the final cost of the products that are purchased.

Here we check whether the EM-18 RFID reader module detected the RFID tag .later after detecting it scans and transmits the information to the arduino nano.Hereafter it is then transferred to the lcd display for the final result.both addition and deletion of products do happen by scanning a rfid cards accordingly.

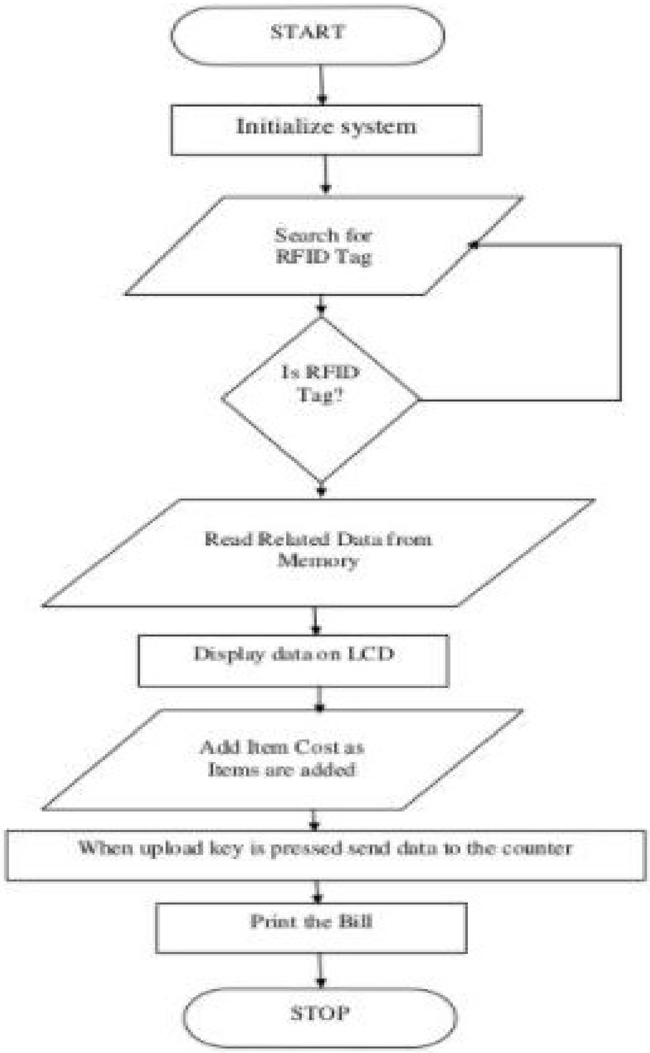


Fig 4.16: Flow of software execution

CHAPTER 5

RESULTS AND DISCUSSIONS

- Initially by using the arduino nano,em 18 reader module(only Vcc and ground of both the components are shorted and power supply is given using mini USB cable) and the rfid cards ,we find the 12 digit RFID card number with the help of Arduino IDE. Here transmitter and reader pins are not connected as such.

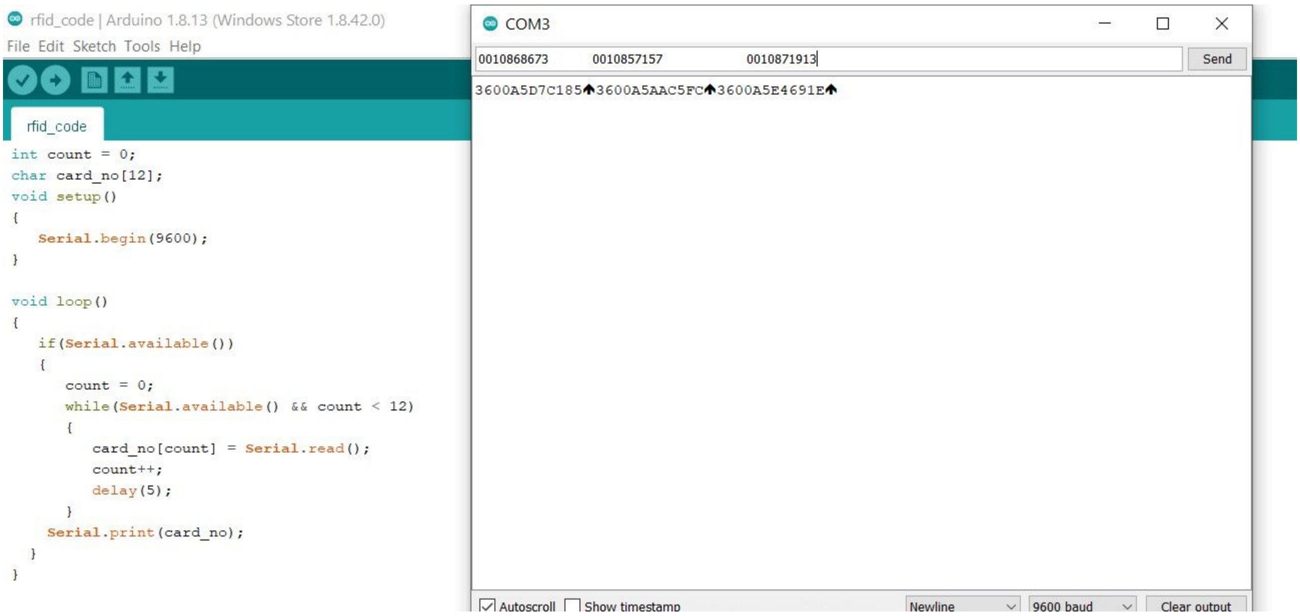
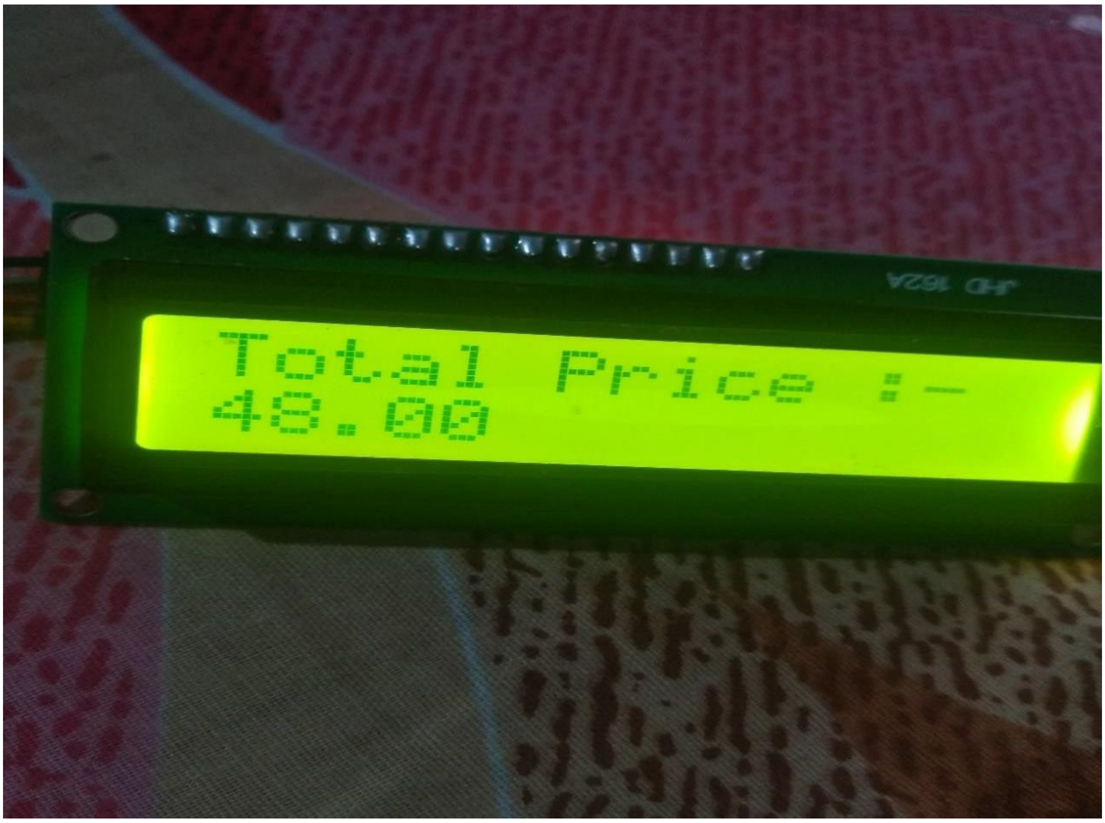


FIG 5.1:RFID 12 DIGIT NUMBER

- Now ,the components are connected accordingly to the circuit diagram and the cards are scanned either addition or deletion of prodcut. Finally after scanning the total price card ,the final output is displayed on the LCd screen respectively.


Butter Added
Price:4.00


Total Price :-
48.00

CHAPTER 6
CONCLUSION AND FUTURESCOPE

Conclusion:

We would like to say that there is much enhancement and smarter way to the mode of project we have implemented. The project we have made is cost effective and friendly for the customers to avoid the billing by standing in the long queues for a longer time .By this, customers can themselves scan the products with out any help of manual billing.The total price of the products is displayed accordingly.As the system is becoming smart ,the requirement of man power decreases.

Futurescope:

The present model is not an advanced model but ut can only banish the existing problem.The model can be made much advanced in the following methods:

1) by using the algorithm in such a way that the security is always maintained rather using simple algorithm

2) we can also add the total products bought and cost of each of them to the mobile itself . So that digital transactions can be done easily as such.

3) we can further make it much advanced by weighing the total cart and cross checking with the bill of products which eliminates the human intervention for cross checking.

4) We can make the model much advance by suing technologies like IoT,deep learning etc.,

Advantages:

1) Major advantage is that we use rfid tags instead of barcodes for scanning which can be scanned upto few cm.
2) Can do self checkout which avoids standing in long queues which is tidious.
3) Trust worthy ,highly dependable and time efficiency.
4) The system can be made much advanced according to the recent technologies.

Applications:

1) Student attendence system
2) Library management system
3) Shopping malls

Limitations:

1) Can read only single item at a time
2) The major part of circuit is done by em 18 reader module which reads the rfid tags.
3) In the present model list of products is not displayed on the LCD screen but only final cost is displayed .

Comparison of present and existing system:

BARCODE (existing technology)	**RFID** (proposed technology)
a) Person is required to read barcode on product.	a) Automatic reading of RFID tag from product.
b) Barcode must be visible on the surface of product.	b) RFID can be placed inside the product.
c) Line of sight required to a read barcode.	c) No line of sight required to read RFID.
d) The readability of barcodes can be impaired by dirt, moisture, abrasion, or packaging contours	d) RFID tags are not affected by such conditions.
e) Short reading distance.	e) Long reading distance.
f) Barcode does not have READ & WRITE capability.	f) RFID tag having READ & WRITE capability.

Fig 6.1:comparison of barcode and rfid

Advantages of RFID over barcode model:

- No “line of sight” requirements. Barcodes need to have line of sight between a scanner and barcode . RFID tags can be read through materials without line of sight
- Automated reading the data.RFID tags can read data without any manual help
- Greater data capacity.

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