Chapter: - 1
Introduction

In the modern world, every supermarket and hypermarkets employ shoppingbaskets and shopping trolleys in order to aid customers to select and store the products which they intend to purchase. The customers have to drop every product which they wish to purchase into the shopping cart and then proceed to checkout atthe billingcounter. The billing process is quite tedious and highly time consumingand has created the need for shops to employ more and more human resource inthe billing section, and yet waiting time remains considerably high. In this paper, weseem it fit to propose the “Intelligent Shopping Basket” which aims to reduce ,andpossibly eliminate the total waiting time of customers, lower the totalmanpowerrequirement and expenses for markets and increase efficiency overall. In a worldwhere techno-logy is replacing the ways we pursue everyday activity, the future ofthe retail industry also lies in more and more automated devices.

1.1 OBJECTIVE

The main objective of this project is to reduce and eliminate time taken inbilling counter in super markets by designing an IntelligentShopping Basket whichuses Barcode scanners to allow users to self-checkout and increase productivitytime.

1.2 Application

- Basket Scanner is use shopping easily, then people can save their time for shopping.
- It can make easily shopping in now a busy day.

1.3 Purpose

The design product can used for number of purposes like: -

- This product can save people time for shopping.
- This product can easily use for make shopping in mall or supermarket.
- This product used for billing section in mall it can make bill faster.

1.4 Scope

This project work is reducing the time which are standing in billing counter for make bill, it can easily make bill so then not stand in queue for bill.

Chapter: -2
System Analysis

2.1 Study of current situation

Now a days their people haven't to waiting in queue for shopping but, people are stand in queue for make a bill or payment. And it makes a crown in mall many people at time that's why is mall or supermarket is look crowdy place where not any one goes.

2.2 Problem and Weakness

- There people have wasted their important time in queue which is only for make bill or payments.
- Stand in queue is boring in queue on counter.

2.3 Requirement of new System

- Basket Scanner is easy way to scan the products during the shopping, and not stand in queue which scan the product by manual.
- This new things in basket scanner it easy to use, it uses by normal people.

Chapter: -3
Requirement& specifications

3.1 Need of Basket Scanner

These products can be used in basket scanner to make and also can be used in supermarket or malls.

3.2 HARDWEAR REQUIRMENT

- POWER SUPPLY (12V TO 5V)
- ARDUINO BOARD
- WIFI MODEM
- RFID READER MODEM AND RFID CARD
- Arduino UNO
- RESET AND CRYSTAL CIRCUIT
- LCD (16 × 2)
- LED
- Node MCU
- Bluetooth Module
- Resistor

3.2.1 POWER SUPPLY (12V TO 5V): -

This is a circuit of a 12V to 5V Converter using a 7805 regulated IC. Thecircuit mentioned here is also a step down DC to DC convertor using LM 7805 ICwhich can provide fixed 5 volt output from any 2V DC. The circuit is ideal to usewith a 12V car battery to step down the voltage to 5 volt DC. LM7805 IS an IC of LM78xx series. It has any built in features like thermal shutdown, short circuit protection and safe operating area protection. These types of ICs are commonly usedin regulated power supply circuits. The circuit diagram shown in figure.

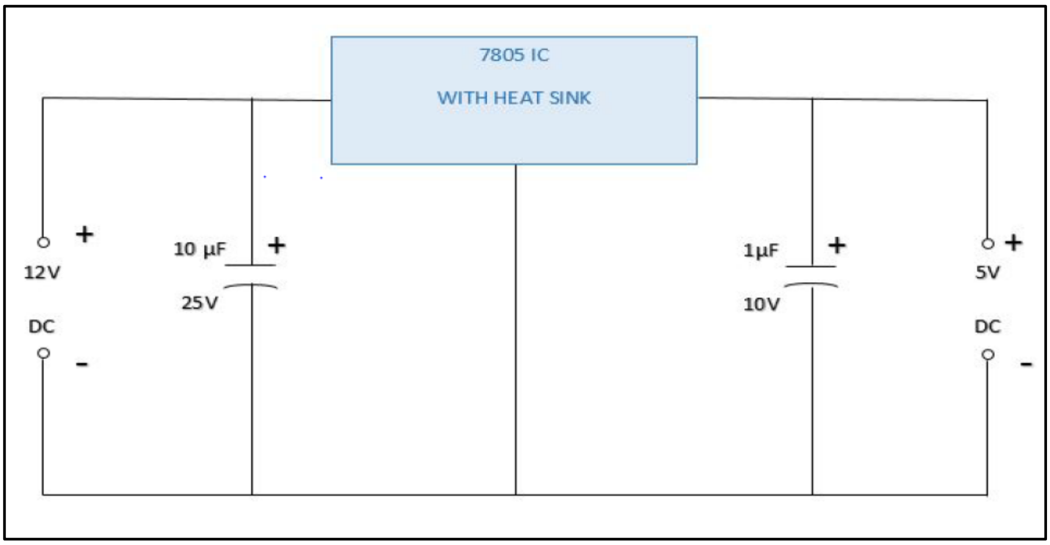


Fig 3.1(circuit diagram of 12v to 5v convertor using 7805)

Features

Input voltage	9V to 12V
Output voltage	5V to 3V
Output current	1A to 3A

3.2.2 ARDUINO BOARD

A Figure of Arduino shown in below, this is an outline of what we will see(parts of the board we might interact with in the course of normal use arehighlighted):

Starting clockwise from the top center:

- Analog Reference pin (orange)
- Digital Ground (light green)
- Digital Pins 2-13 (green)
- Digital Pins 0-1/Serial In/Out - TX/RX (dark green) - These pins cannot beused for digital I/O (digital Read and digital Write) if we are also using serialcommunication (e.g. Serial. Begin).
- Reset Button - S1 (dark blue)
- In-circuit Serial Programmer (blue-green)
- Analog In Pins 0-5 (light blue)
- Power and Ground Pins (power: orange, grounds: light orange)

● External Power Supply In (9-12VDC) - X1 (pink)
● Toggles External Power and USB Power (place jumper on two pins closest todesired supply) - SV1 (purple)
● USB (used for uploading sketches to the board and for serial communicationbetween the board and the computer; can be used to power the board)(yellow)

Microcontrollers

1) ATmega328 (used on most recent boards)

Specifications	
Digital I/O Pins :	14 (of which 6 provide PWM output)
Analog Input Pins :	6 (DIP) or 8 (SMD)
DC Current per I/O Pin :	40 mA
Flash Memory :	32 KB
SRAM :	2 KB
EEPROM :	1KB

❖Specifications

General purpose working registers, three flexible timer/counters with comparemodes, internal and external interrupts, serial programmable USART, abyte-oriented 2-wireserial interface, SPI serial port,6-channel 10-bit A/Dconverter(8-channels in TQFP and QFN/MLF packages), programmable watchdogtimer 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

A common alternative to theme parameters Series alternativesATmega328 is the "Pico Power"ATmega328P. A comprehensive list of all other member of the megaAVR series can be found on the Atmel website.
As of 2013 the ATmega328 is commonly used in many projects and autonomoussystems where a simple, low powered, low-cost microcontroller is needed. Perhapsthe most common implementation of this chip is.

❖ Applications

Parallel program mode	
Parameter	**Value**
CPU type	8-bit AVR
Performance	20 MIPS at 20 MHz
Flash memory	32 kB
SRAM	2 kB
EEPROM	1 kB
Pin count	28-pin PDIP, MLF, 32-pin TQFP, MLF
Maximum operating frequency	20 MHz
Number of touch channels	16
Hardware QTouch Acquisition	No
Maximum I/O pins	26
External interrupts	2
USB Interface	No

On the popular Arduino development platform, namely the Arduino Uno andArduino Nano models. Reliability qualification shows Programming pin out ofATmega48A/PA/88A/PA/168A/PA/328/P in 28-PDIPthat the projected data retentionFailure rate is much less than 1PPM over 20 years at 85 °C or100 years at 25 °C.

Programming mode is entered when PAGEL (PD7), XA1 (PD6), XA0 (PD5),BS1 (PD4) is set to zero. RESET pin to 0V and VCC to 0V. VCC is set to 4.5 -5.5V.Wait 60 µs, and RESET is set to 11.5 -12.5 V. Wait more than 310 µsSetXA1:XA0:BS1: DATA = 100 1000 0000, pulse XTAL1 for at least150 ns, pulseWR to zero. This starts the Chip Erase. Wait until RDY/BSY (PD1) goeshigh.XA1:XA0:BS1: DATA =100 00010000, XTAL1 pulse, pulse WR to zero. This isthe Flash write command. And so on.

Serial Programming			
Symbol	**Pins**	**I/O**	**Description**
MOSI	PB3	PB3	Serial data in
MISO	PB4	O	Serial Data out
SCK	PB5	I	Serial Clock

Serial data to the MCU is clocked on the rising edge and data from the MCUis clocked on the falling edge. Power is applied to VCC while RESET and SCK areset to zero. Wait for at least 20 ms and then the Programming Enable serialinstruction 0xAC, 0x53, 0x00, 0x00 is sent to the MOSI pin. The second byte (0x53)will be echoed back by the MCU.

2) ATmega168 (used on most Arduino Decimal and early Duemilanove)

Specifications	
Digital I/O Pins :	14 (of which 6 provide PWM output)
Analog Input Pins :	6 (DIP) or 8 (SMD)
DC Current per I/O Pin :	40 mA
Flash Memory :	16 KB
SRAM :	1 KB
EEPROM :	512 bytes

Digital Pins

In addition to the specific functions listed below, the digital pins on an Arduinoboard can be used for general purpose input and output via the pin Mode (), digitalRead () and digital Write () commands. Each pin has an internal pull-up resistorwhich can be turned on and off using digital Write () (w/ a value of HIGH or LOW,respectively) when the pin is configured as an input. The maximum current per pin is40 mA.

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTLserial data. On the Arduino Decimal, these pins are connected to thecorresponding pins of the FTDI USB-to-TTL Serial chip. On the ArduinoBT, they are connected to the corresponding pins of the WT11 Bluetoothmodule. On the Arduino Mini and Lily Pad Arduino, they are intended foruse with an external TTL serial module (e.g. the Mini-USB Adapter).

- External Interrupts: 2 and 3. These pins can be configured to trigger aninterrupt on a low value, a rising or falling edge, or a change in value.

- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the AnalogWrite function. On boards with an ATmega8, PWM output is available onlyon pins 9, 10, and 11.

- BT Reset: 7. (Arduino BT-only) Connected to the reset line of theBluetooth module.

- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPIcommunication, which, although provided by the underlying hardware, isnot currently included in the Arduino language.

- LED: 13. On the Decimal and Lily Pad, there is a built-in LED connected todigital pin 13. When the pin is HIGH value, the LED is on, when the pin isLOW, it's off.

Analog Pins

In addition to the specific functions listed below, the Analog input pins support10-bit Analog-to-digital conversion (ADC) using the Analog Read () function. Most ofthe Analog inputs can also be used as digital pins: Analog input 0 as digital pin 14through Analog input 5 as digital pin 19. Analog inputs 6 and 7 (present on the Mini
and BT) cannot be used as digital pins.

- I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the Wirelibrary

Power Pins

- VIN (sometimes labelled "9V"). The input voltage to the Arduino board whenit's using an external power source (as opposed to 5 volts from the USBconnection or other regulated power source). You can supply voltage throughthis pin, or, if supplying voltage via the power jack, access it through this pin.Note that different boards accept different input voltages ranges, please seethe documentation for your board. Also note that the Lily Pad has no VIN pinand accepts only a regulated input.

- 5V.The regulated power supply used to power the microcontroller and othercomponents on the board. This can come either from VIN via an on-boardregulator, or be supplied by USB or another regulated 5V supply.

- 3V3. (Decimal-only) A 3.3 volt supply generated by the on-board FTDI chip.

- GND. Ground pins.

Other Pins

- AREF. Reference voltage for the Analog inputs. Used with Analog Reference.

- Reset. (Decimal-only) Bring this line LOW to reset the microcontroller.Typically used to add a reset button to shields which block the one on theboard.

3.2.3 WIFI MODEM

This Module Works On 3.3V Voltage Range. So Make Sure You Do NotConnect More Than 5 Volt With This Module Otherwise Your Module Will GetDamaged. It Works On Serial Communication. I Will Further Explain It In Later PartOf This Article. This Module Has Six Pins As Shown In Figure:

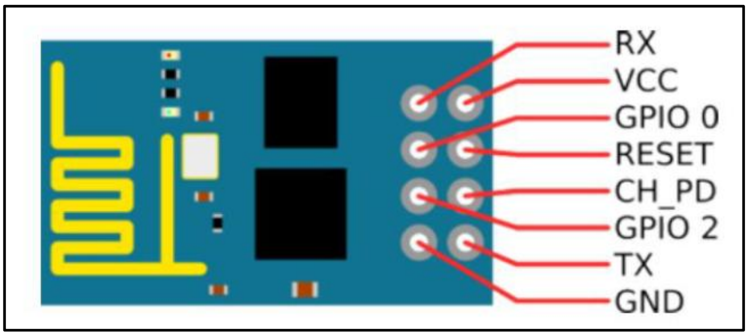


Fig 3.2 (layout of Wi-Fi modem)

Wi-Fi Module (ESP8266) Configuration

- **V cc pin:** This pin is used to provide power supply. We should connect 3.3V with this pin and voltage more than 3.3 volt burns this Wi-Fi module.

- **GND pin** : Connect ground terminal of power supply with this pin

- **RX pin**: This is a receiver pin of ESP8266 Wi-Fi module. This module works on UART serial communication. So this pin is used to receive data from microcontroller or any other device to which you want to send data.

- **TX pin**: This is a transmitter pin of ESP8266 Wi-Fi module. It is used to send or transmit data to microcontroller or any other device which works on serial communication principle.

- **GPIO 0 And GPIO 2:** These Are General Purpose Input Output Pins Which Are Used to Directly Interact with External Digital World. This Module Can Also Be Used As A Stand Along Device To Make IOT Based Projects. But I Will Not Discuss This Aspect In This Article. I Will Write A Separate Article On It. But In Today's article, I Will Write Only On How to interface ESP8266 Wi-Fi Module with Pic-microcontroller.

- **RESET pin:** It is used to reset this module. It is active high pin and it will resetthe module when you apply 3.3 volt.

- **CH_PD pin:** Connect 3.3 volt of this pin.

Wi-Fi Module (ESP8266) Interfacing with Pic Microcontroller

To interface this module with any microcontroller and any digital device weshould know about operating voltages of this device and microcontroller. As wementioned earlier, operating voltages of ESP8266 Wi-Fi module is 3.3 volt. So itstransmission and receiver signal will be also be 3.3 volt amplitude. So when we areconnecting this module with any Pic microcontroller, we need to make sure either both have same operating voltages or we need to connect any circuit with ESP8266and Pic microcontroller. This circuit should be cable of converting 3.3 volt signal to 5volt and 5 volt signal to 3.3 volt. We can also use voltage divider for this purpose.

It will explain it in more details in coming paragraphs. We are usingpic18f46k22 picmicrocontroller in this tutorial. Operating voltages of thisPic-microcontroller is 5 volt. So we need to use any circuit between ESP8266 Wi-Fimodule and Pic-microcontroller. We can use a voltage divider between TX pin ofPic-microcontroller and Rx pin of ESP8266 Wi-Fi module. Voltage divider will stepdown 5 volt signal of Pic-microcontroller transmitter to 3.3 volt which is in range of
operating voltages of Wi-Fi module. We can connect transmit of Wi-Fi moduledirectly with Pic18f46k22 microcontroller, because this Pic-microcontroller have widerange of operating voltages between 3.3V and 5 volt. So there is no need of voltagedivider between Rx pin of esp8266 and Pic18f46k22 microcontroller, becausemicrocontroller will read 3.3 volt as a high signal. Interfacing connections are shown Figure:

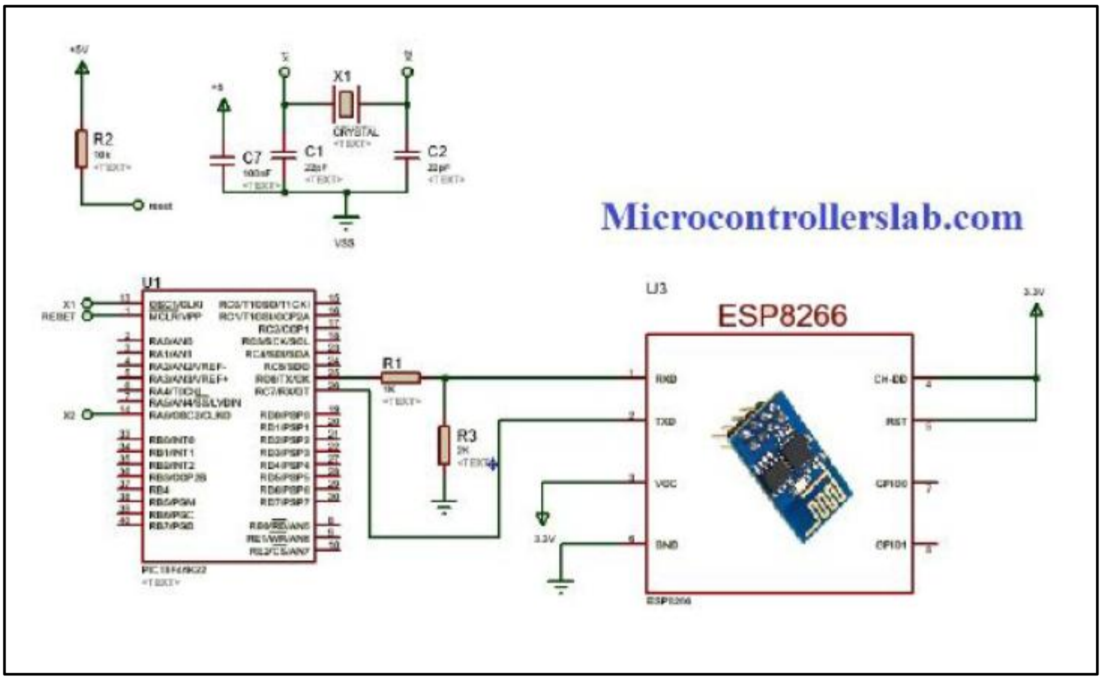


Fig 3.3 (circuit diagram of ESP8266 WIFI modem)

As shown in above circuit diagram, we have connected 1k and 2k resistorbetween T x pin of microcontroller and Rx pin of esp8266.If we does not know, wecan use a dedicated chip as 5 volt to 3.3 volt converter. Pic microcontroller andesp8266 Wi-Fi module communicate with each other through UART serialcommunication. So we should know how to use serial communication of picmicrocontroller. ESP8266 Wi-Fi Module responds to “AT”commands. We will sendat commands to this Wi-Fi module from pic microcontroller through serialcommunication. Before using AT commands we should set the Baud rate of thismodule to 9600 because by default baud rate of this Wi-Fi module is 115200.

```
AT+ UART_DEF = 9600, 8,1,0,0
```

This command is used to set baud rate of ESP8266 Wi-Fi module to 9600permanently.

3.2.4 RFID READER MODEM AND RFID CARD

RFID is an acronym for Radio Frequency Identification - The use of wireless communications to establish the identity of a physical object. RFID term is used to describe a system that transmits the identity (in the form of a unique serial number – EPC – Electronic Product Code) of an object wirelessly, using radio waves. RFID technology provides wireless identification of people, books or assets. A RFID tag is attached to an object and contains information about that object.

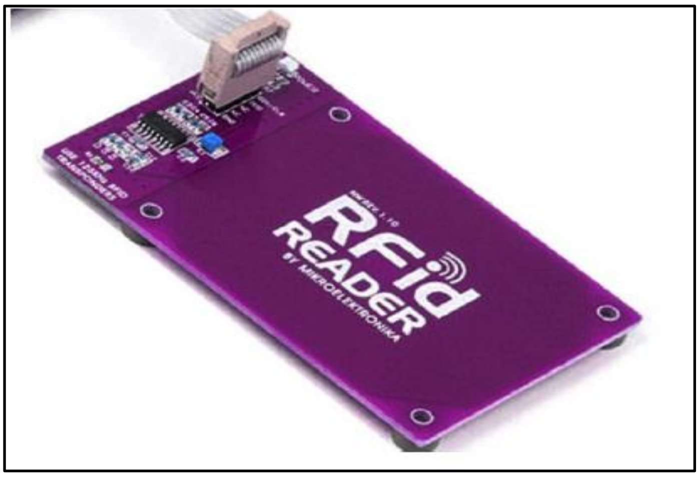


Fig 3.4 (RFID reader modem)

Data transmitted from the tag can be product, location or any other information. The main popularity of the RFID system was that it has the ability totrack moving objects. RFID tag (Shown in Figure 7) consists of a chip with anantenna. The chip helps to store 2Kb of data. Also RFID tags can work on differentfrequencies. When the tag comes in reach with the **RFID reader** the reader willdetect the tag and sends a 12 digit unique code of data present in the tag serially.

Fig 3.5 (RFID card)

Barcodes attached to objects is a representation of data that is machine readable.They represent the data with the help of parallel lines with definite width andspacing’s. Today, RFID are considered to be smarter than barcodes.

- **RFID Card:-**

Tag is made up of an integrated antenna and memory. The information can be written and rewritten on Tag memory. The unique ID written on Tag while manufacturing is known as the EPC (Electronic Product Code). This Tag is enclosed in a Rectangular Plastic Card of the size of Bank Debit / credit card.

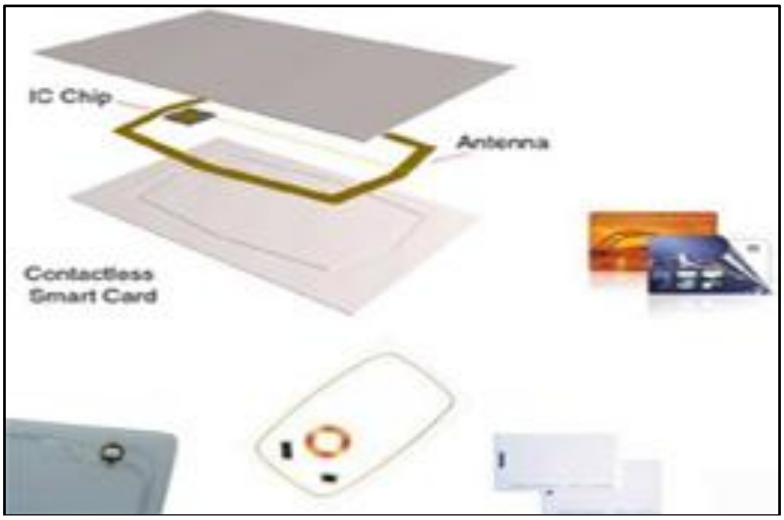


Fig 3.6 (RFID Card internal features)

- **RFID Reader: -**

An RFID reader is a device that is used to read RFID tag data. The reader has an antenna that emits radio waves; the tag responds by sending back data stored in it to Reader.

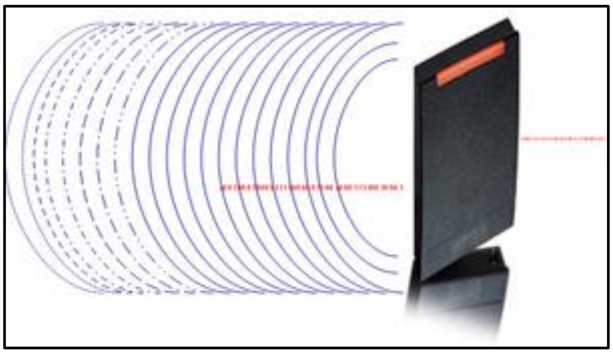


Fig 3.7 (RFID Reader Single)

- **Component used to interface RFID with Microcontroller**

In order to perform RFID interfacing, the major components to be used are:

<u>Hardware Components:-</u>

1. Microcontroller
2. RFID reader
3. RFID Tag
4. MAX232 IC
5. LCD (Display-16*2)

<u>Software Components:-</u>

1. Programming in Embedded C
2. Using Keil C compiler
3. Programmer

3.2.5Arduino UNO

The Arduino is the open source microcontroller development board based on the ATMEGA328P microcontroller IC designed to provide the simple and cheap platform to the hobbyists and students for designing their digital and embedded systems projects. The ATMEGA328P microcontroller IC is the heart of the Arduino microcontroller development that is the board is designed around the ATMEGA328P microcontroller IC.

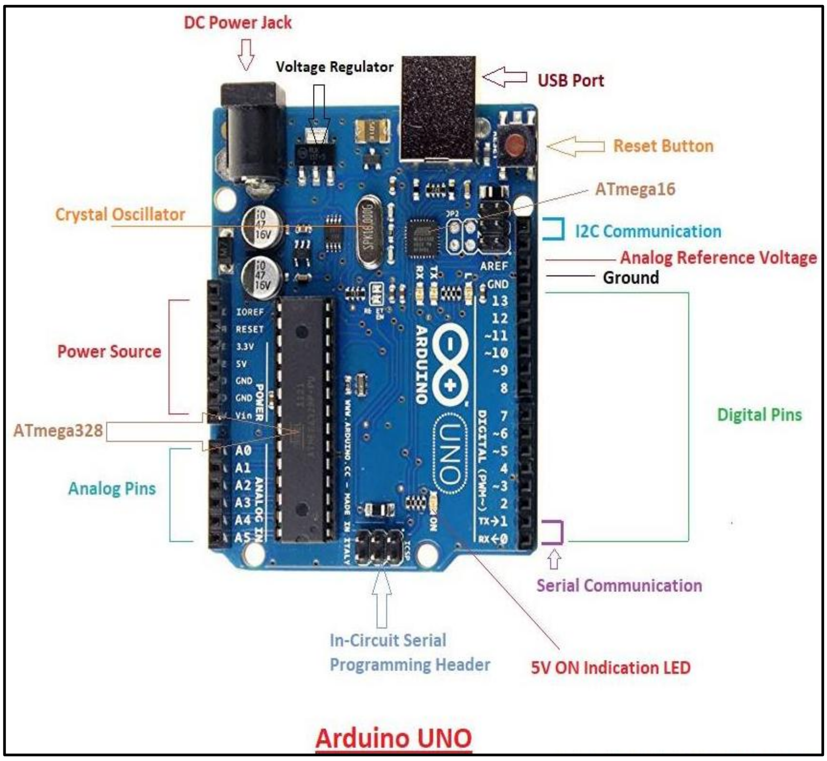


Fig 3.8 (Arduino UNO)

The Arduino UNO microcontroller development looks like the one in the above image.

Arduino UNO is programmed via type B USB connector mounted on board. A USB cable is used to connect the Arduino board to the PC or laptop. When plugged in to the USB cable it is also powered up which means you do not need an additional power supply while programming your Arduino with your laptop or computer.

Arduino development board has on-board voltage regulator and can supply 5volts and 3V3 to power up the low power components. Arduino UNO can be powered up with either power jack or it can also be powered up with the help of the pin on the header.

The Arduino microcontroller development board has one UART, SPI (Serial Peripheral Interface) interface and I2C (Inter-Integrated Circuit) interface which means it can communicate to the peripheral ICs that has these interfaces. The detailed discussion on each of these Interfaces and their use in Arduino will be done later in next post here I will stick just to the basics.

Arduino UNO is quite easy to program. As most of you might have known that in order to program a microcontroller one need to write the code in the editor, and then compile that code in the compiler after which you get the HEX file of that code and later upload that HEX file in the microcontroller IC using another program. In case of Arduino all these steps are performed in single software which is called the Arduino IDE. By integrated Development Environment it means that all the steps that editor, compiler, burner are integrated in the same software. In short Arduino UNO is quite easy to program it is just a matter of few clicks.

3.2.6 RESET AND CRYSTAL CIRCUIT

The function of an oscillator circuit is to provide an accurate and stableperiodic clock signal to a microcontroller. The frequency of this clock signal canrange from a few kilohertz to tens of megahertz and determines how quickly themicrocontroller executes its instructions. Most microcontrollers include a clock drivercircuit which is designed to drive a quartz crystal into oscillation. The clock drivercircuitry built into the PICmicro family is very flexible and allows for four differentclocking options: clock signal supplied from another oscillator, an R-C clock (basedon a resistor-capacitor charging time constant), a ceramic resonator, or a crystaloscillator.

An R-C clock circuit is the simplest but does not provide accurate timing sinceboth resistor and capacitor values can vary greatly with temperature. Crystal oscillator and ceramic resonator-based clock circuits provide the most stable andaccurate time-based, and require only a few extra parts than a simple R-C oscillator(see the schematic diagram, below.)

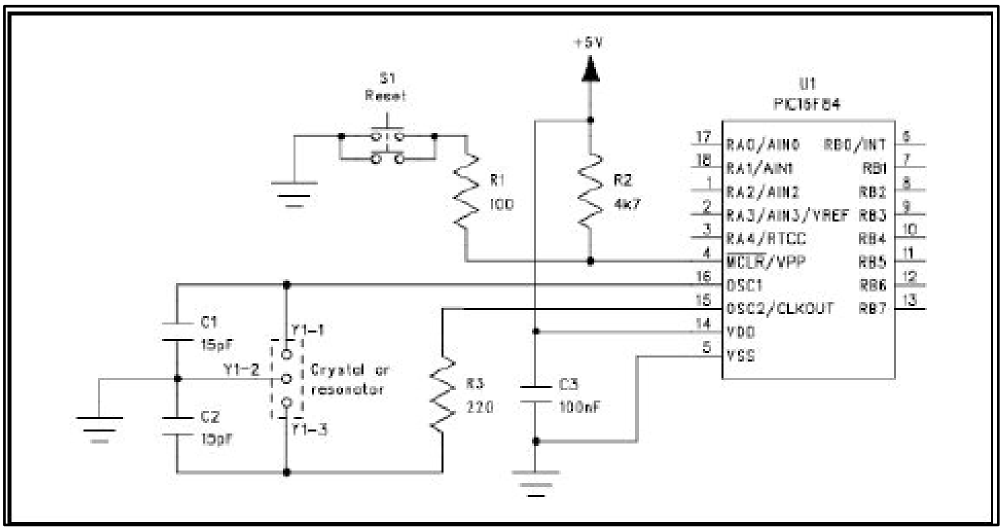
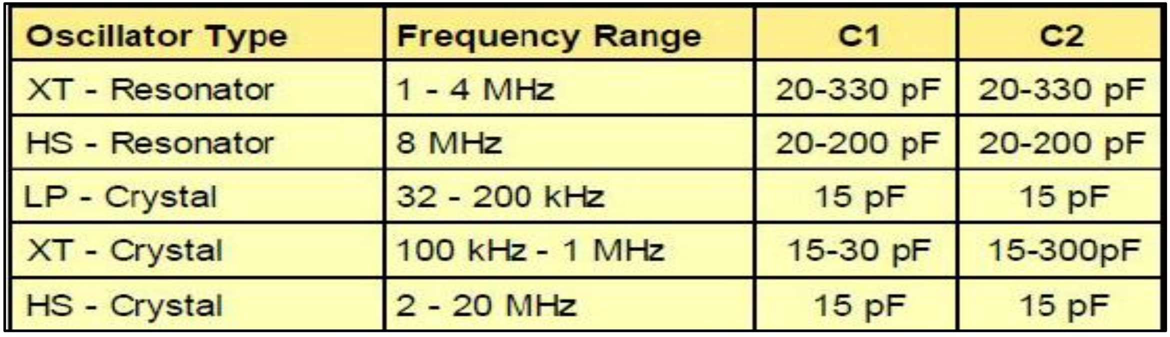


Fig 3.9 (The schematic diagram illustrates both the clock oscillator and reset circuit)

The clock circuit consists of capacitors C1 and C2, a quartz crystal or ceramicresonator Y1, and a series resistor, R3. The values of capacitors C1 and C2 isdetermined by both the clock speed at which you intend to run the PICmicro, and bythe selection of a quartz crystal or a ceramic resonator as the clock source. Use thetable as a
guide to select the appropriate capacitors.



Oscillator Type	Frequency Range	C1	C2
XT - Resonator	1 - 4 MHz	20-330 pF	20-330 pF
HS - Resonator	8 MHz	20-200 pF	20-200 pF
LP - Crystal	32 - 200 kHz	15 pF	15 pF
XT - Crystal	100 kHz - 1 MHz	15-30 pF	15-300pF
HS - Crystal	2 - 20 MHz	15 pF	15 pF

When the capacitance of C1 or C2 is shown as a range of values, select ahigher capacitance for lower frequencies of operation, and a lower capacitance forhigher clock frequencies. For example, when using the XT oscillator mode with a 100kHz quartz crystal, select a value of C1 close to 30 pF and a value of C2 close to300 pF for the best performance.

Series resistor R3 is required for some types of crystals in HS or XT mode.Including R3 with crystals that do not require a series resistor will not degrade theperformance of the oscillator circuit. A low value of resistance, up to a few hundredohms, will keep the clock driver circuit in the PICmicro from overdriving the crystal.

Selecting the Components

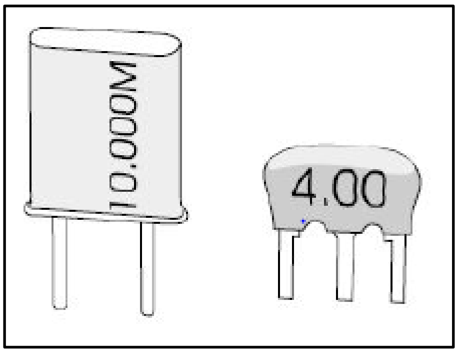


Fig 3.10 (Ceramic resonator)

Quartz crystals and ceramic resonators are similar, but have some physicaldifferences. As shown in the diagram, quartz crystals are typically mounted in ahermetically sealed metal case with two wire leads protruding from the bottom.Sometimes crystals may have a third ground lead soldered or welded to the top ofthe metal can. Grounding the pin on the metal can helps to both stabilize the crystal, lessening the impact of mechanical shock, as well as reduces RF emissions.

Select a quartz crystal specified as a microprocessor crystal, rather than atuning crystal for a radio. Typically, these are stocked in common frequencies bymost large electronic distributors.

Ceramic resonators are usually produced in the form of molded or dippedparts with two or three wire leads. The center wire, if present, connects to the circuitground.

Both quartz crystals and ceramic resonators are non-polarized electronicdevices and can be installed in the oscillator circuit in either orientation.

Lastly, the type of resistor and capacitors chosen for the circuit are not critical.Any ceramic or monolithic capacitor of the suggested value should work, as shouldany typical ¼ watt metal or carbon film resistor.

Building the Oscillator

A few general precautions should be observed when building the oscillatorcircuit. Since the clock oscillator is typically the source of the fastest signals, andpotentially, the major source of RF emissions in a circuit, good design practicedictates that all clock circuit signal lengths should be kept as short as possible. Agood, low impedance ground return wire from capacitors C1 and C2 to the circuit ground is also necessary.

Some PICmicros, like the PIC16C711, use the pins adjacent to the clockoscillator circuit as analog inputs. For accurate analog to-digital conversion it isespecially important to minimize the length of any clock oscillator signal wiresrunning in parallel with the analog input lines. Ideally, separate the analog signallines from any digital signals by using a ground wire as a shield between all analogand digital wiring.

Programming the Clock

Before you download your program into a PICmicro, you must select theappropriate clock oscillator fuse settings. These settings tell the PICmicro which ofthe four clock oscillator options to use. The oscillator fuse settings are most a typicalcrystal (left) and resonator. Commonly set by the downloading software, but someassemblers allow you to specify the oscillator type in your source code. Make surethat you know how to select the oscillator before programming your microcontroller.

The Reset Circuit

A real reset circuit is not necessary in order for a PICmicro to function in acircuit. The only component required to run a PICmicro, other than those parts thatmake up the oscillator circuit, is a pull-up resistor connected to the MCLR/ V pp pin. Inthe schematic diagram, R2 functions as the pull-up resistor. If you omit the pull-upresistor, your PICmicro will remain in reset (clear) mode on power-up, and will notexecute its program.

Resistor R1 and pushbutton switch S1 make up an actual reset circuit. WhenS1 is pressed, it completes a low impedance connection from the MCLR/Vpp pin toground, forcing the PICmicro into reset (clear) mode. Resistor R1 is optional, and isused to limit the current on the MCLR/Vpp pin to prevent a condition called latchup—in which the input circuit of a CMOS chip can become ‘stuck’. Electrostaticdiscard (ESD) from a person touching the reset switch could potentially causelatch-up.

S1 is not two pushbutton switches as the schematic seems to indicate. Weuse a small pcbmounted pushbutton switch with four legs in our circuits—that’s whythe one in the schematic is shown with four circles attached to wires. There is onelast part in the basic oscillator and reset circuit. Capacitor C3 is a decouplingcapacitor which forms part of the power supply circuit.

3.2.7 LCD (16 × 2)

16×2 LCD is named so because, it has 16 Columns and 2 Rows (shown infigure 3.12 & 3.13). There are a lot of combinations available like 8×1, 8×2, 10×2, and16×1 etc. But the most used one is the 16×2 LCD. Hence we are using it hereAll the above mentioned LCD display will have 16 Pins and the programmingapproach is also the same and hence the choice is left to you. Below is the Pin out
and Pin Description of 16×2 LCD Module:

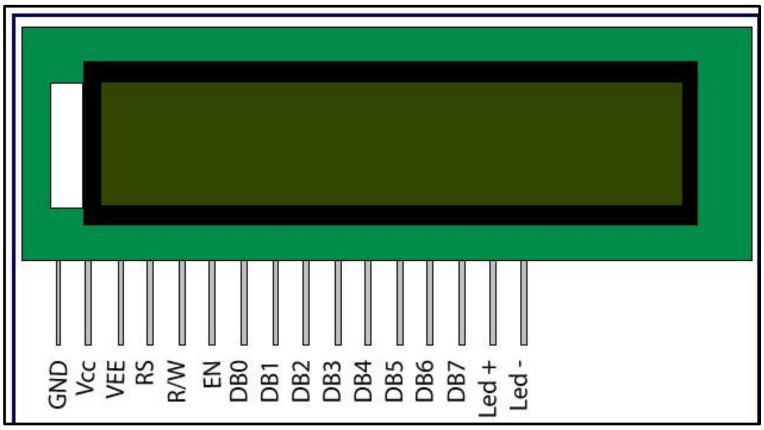


Fig 3.11 (Layout of LCD)

LCD, an acronym for Liquid Crystal Display revolutionized the modern display technology with its compactness and versatility. Today it is seen embedded in various electronic gadgets and devices like T.V., Computers, Laptops, Watches, etc. A Liquid crystal coating is the heart of the display which is sandwiched between two polarized glasses.

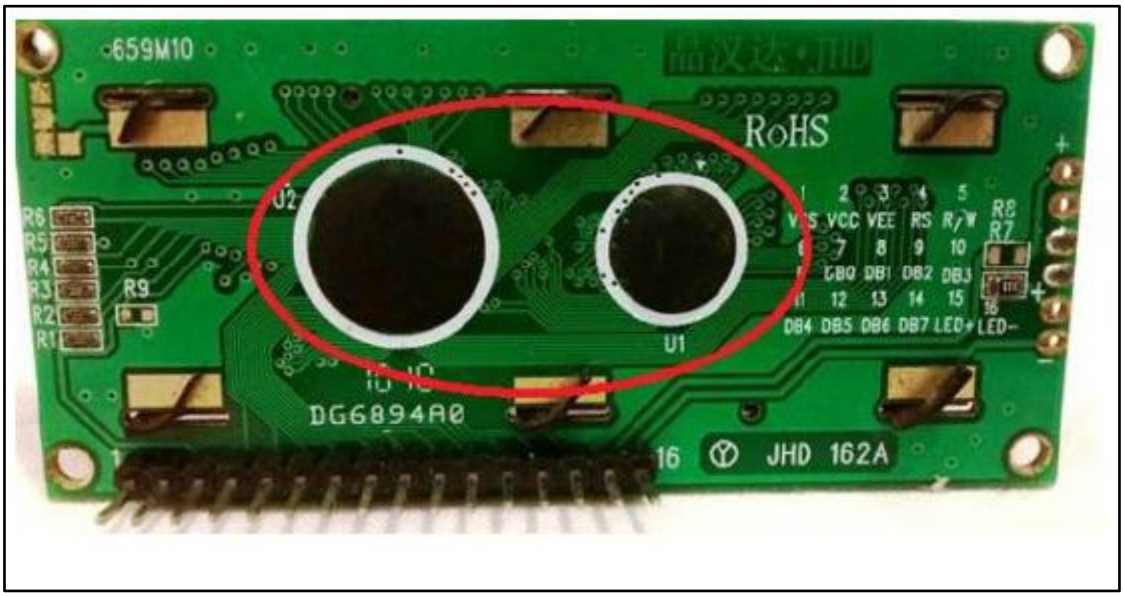


Fig 3.12 (Back view of LCD)

LCD's are available in various shapes and sizes depending on the configurations. A 16x2 LCD shown in the image below can display 32 characters with 16 characters in each row. It is capable to display any character with ASCII values ranging from 0 to 255.

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

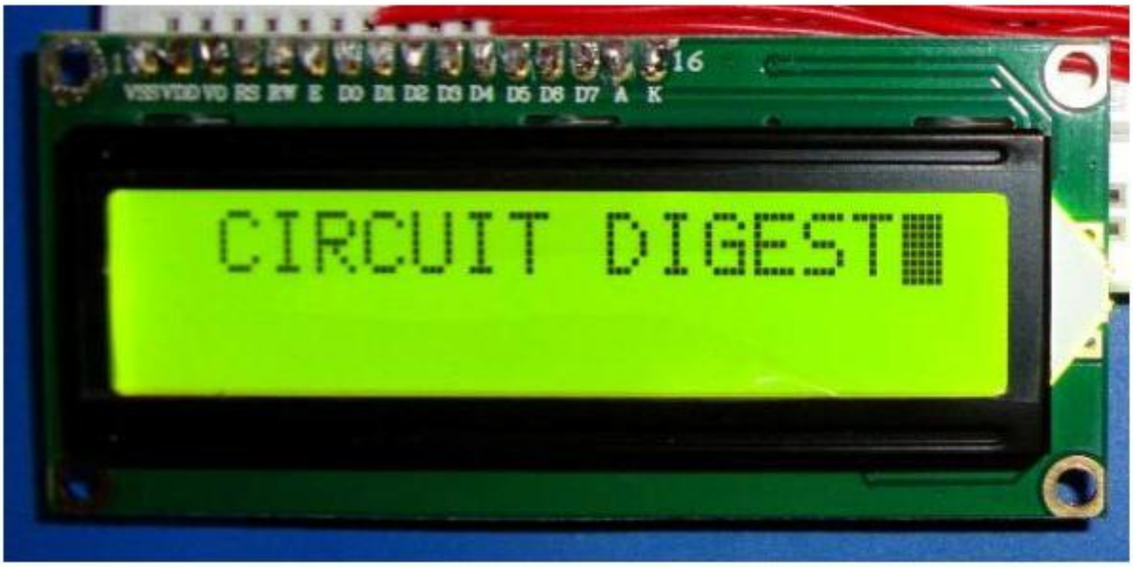


Fig 3.13 (Front view of LCD)

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

3.2.8 LED

Light emitting diodes (LEDs) are semiconductor light sources. The light emitted from LEDs varies from visible to infrared and ultraviolet regions. They operate on low voltage and power. LEDs are one of the most common electronic components and are mostly used as indicators in circuits. They are also used for luminance and optoelectronic applications.

Based on semiconductor diode, LEDs emit photons when electrons recombine with holes on forward biasing. The two terminals of LEDs are anode (+) and cathode (-) and can be identified by their size. The longer leg is the positive terminal or anode and shorter one is negative terminal.

The forward voltage of LED (1.7V-2.2V) is lower than the voltage supplied (5V) to drive it in a circuit. Using an LED as such would burn it because a high current would destroy its p-n gate. Therefore a current limiting resistor is used in series with LED. Without this resistor, either low input voltage (equal to forward voltage) or PWM (pulse width modulation) is used to drive the LED. Get details about internal structure of a LED.

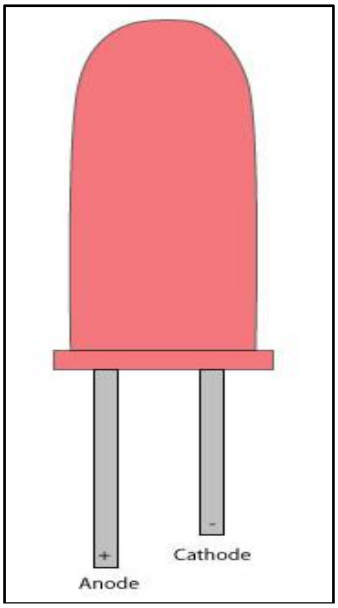


Fig 3.14 (LED light)

3.2.9 Node MCU

Node MCU is an open source IoT (internet of things) platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua (Programming Language) scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjsonand SPIFFS.

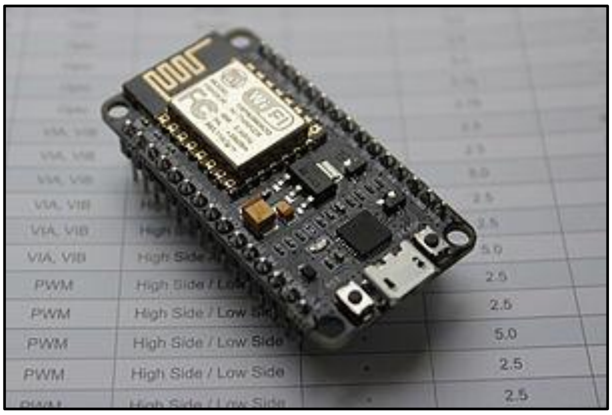


Fig 3.15 (Node MCU)

3.2.10 Bluetooth Module

It is used for many applications like wireless headset, game controllers, wireless mouse, wireless keyboard and many more consumer applications. It has range up to <100m which depends upon transmitter and receiver, atmosphere, geographic & urban conditions. It is IEEE 802.15.1 standardized protocol, through which one can build wireless Personal Area Network (PAN). It uses frequency-hopping spread spectrum (FHSS) radio technology to send data over air. It uses serial communication to communicate with devices. It communicates with microcontroller using serial port (USART).

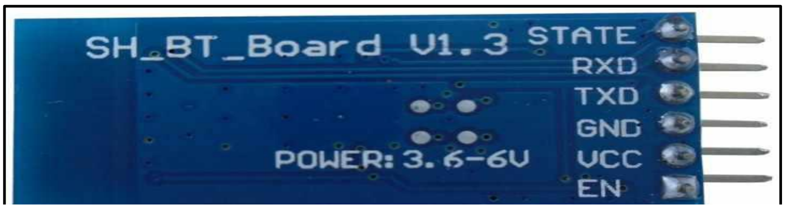


Fig 3.16 (Bluetooth Module)

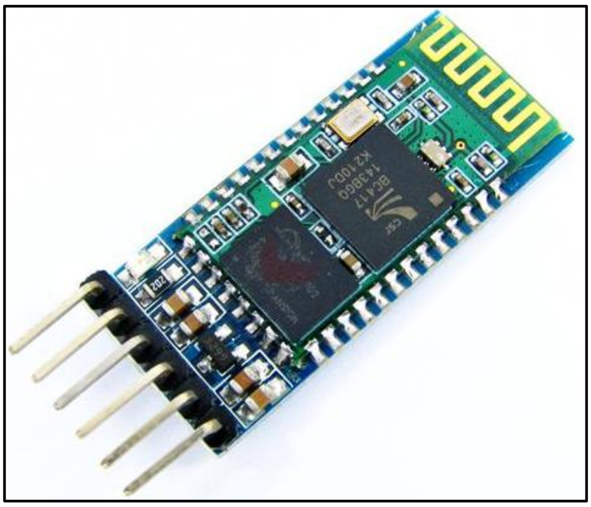


Fig 3.17 (6 Pins module)

It has 6 pins,

1. **Key/EN:** It is used to bring Bluetooth module in AT commands mode. If Key/EN pin is set to high, then this module will work in command mode. Otherwise by default it is in data mode. The default baud rate of HC-05 in command mode is 38400bps and 9600 in data mode.

HC-05 module has two modes,

1. **Data mode:** Exchange of data between devices.

2. **Command mode:** It uses AT commands which are used to change setting of HC-05. To send these commands to module serial (USART) port is used.

2. **VCC:** Connect 5 V or 3.3 V to this Pin.

3. **GND:** Ground Pin of module.

4. **TXD:** Transmit Serial data (wirelessly received data by Bluetooth module transmitted out serially on TXD pin)

5. **RXD:** Receive data serially (received data will be transmitted wirelessly by Bluetooth module).

6. **State:** It tells whether module is connected or not.

3.2.11 Resistor

Resistor is an electrical component that reduces the electric current. The resistor's ability to reduce the current is called resistance and is measured in units of ohms (symbol: Ω).

If we make an analogy to water flow through pipes, the resistor is a thin pipe that reduces the water flow.

Ohm's law

The resistor's current *I* in amps (A) is equal to the resistor's voltage *V* in volts (V)
divided by the resistance *R* in ohms (Ω):

$$I = \frac{V}{R}$$

The resistor's power consumption *P* in watts (W) is equal to the resistor's current *I* in amps (A)
times the resistor's voltage V in volts (V):

$P = I \times V$

The resistor's power consumption P in watts (W) is equal to the square value of the resistor's current I in amps (A).

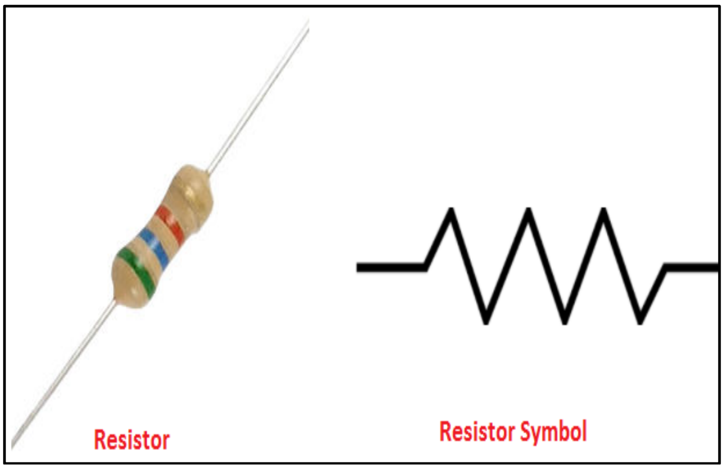


Fig 3.18 (Resistor)

Chapter: - 4

Technology

It will be built in this hardware and software configuration:

4.1 Hardware Requirement

Computer with following minimum configuration

- PC/Laptop [6GB+ RAM/ 800GB HDD]
- Processor is Intel i5 or Higher
- Arduino Nano
- Node MCU
- Bluetooth Module

4.2 Software Requirement

- Android Studio
- Arduino PC Software

4.3 Tool and Technology

Technology Used: Android 5.1 version & above.

GUI Tools: Android Studio v3.2.1, Arduino v1.8.7.

4.4 Justification of Tools and Technology

- Android

Android is the world most popular mobile platform. Android is a Linux-basedoperating system developed by Google. Android is unique because Google is activelydeveloping the platform but giving it away for free to hardware manufacturers and phonecarriers who want to use Android on their devices. It designed primarily for touch screenmobile devices such as smart phones and tablet computers. Initially developed byAndroid.

- Android Studio

Android Studio is the official integrated development environment (IDE)for Google Android operating system, built on JetBrainsIntelliJ IDEA software anddesigned specifically for Android development. It is available for downloadon Windows, macOS and Linux based operating systems. It is a replacement forthe Eclipse Android Development Tools (ADT) as the primary IDE for native Androidapplication development.

- Arduino

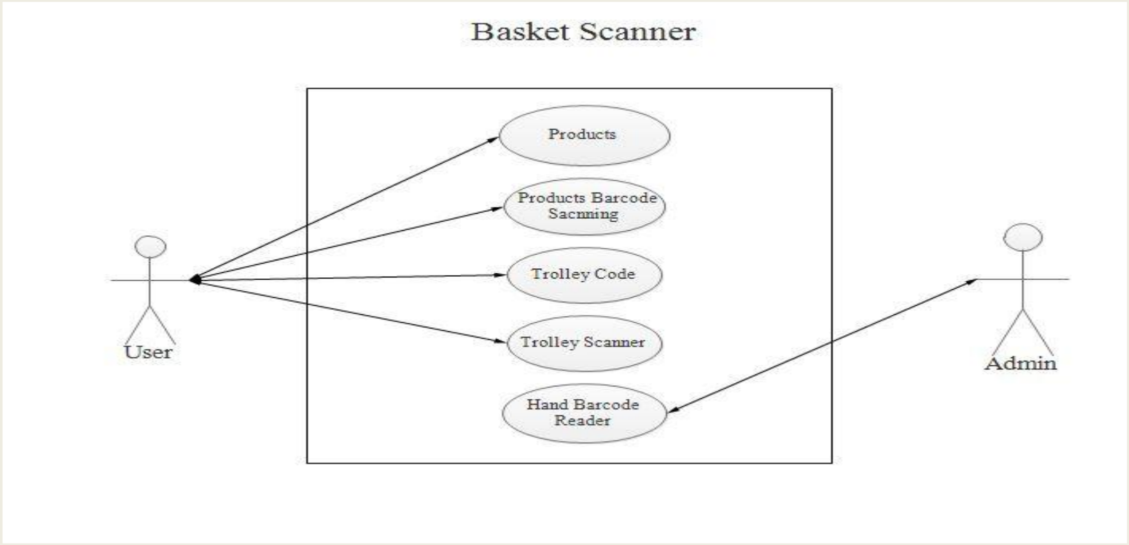
Arduino is an open-source hardware and software company, project and user communitythat designs and manufactures single-board microcontrollers and microcontroller kits forbuilding digital devices and interactive objects that can sense and control objects in thephysical and digital world. Its products are licensed under the GNU Lesser GeneralPublic License (LGPL) or the GNU General Public License (GPL), permitting themanufacture of Arduino boards and software distribution by anyone. Arduino boards areavailable commercially in preassembled form or as do-it-yourself (DIY) kits.

CHAPTER: - 5

System Design

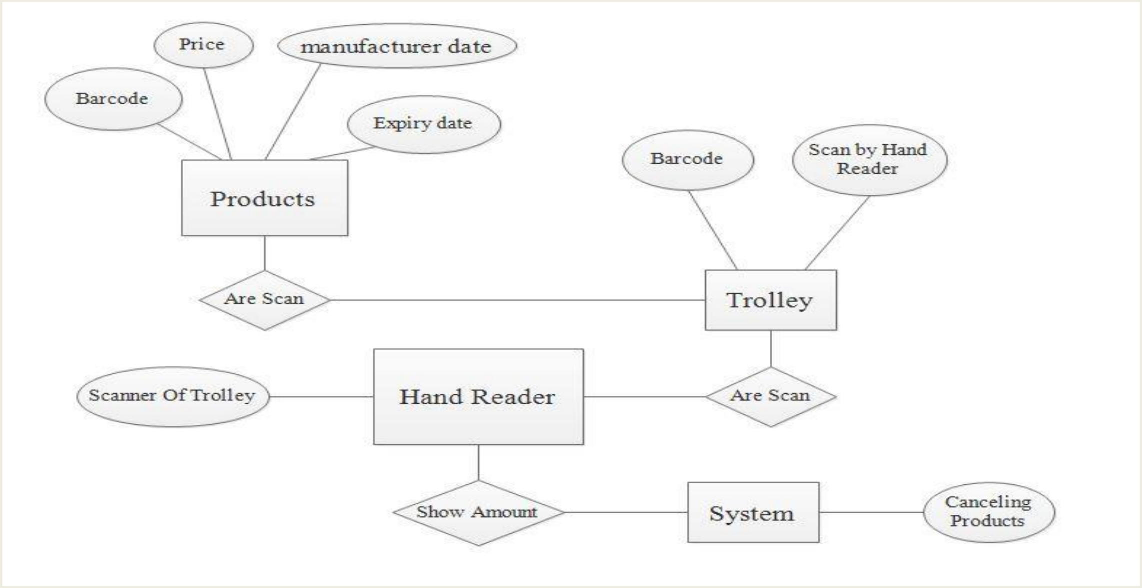
5.1 Use Case Diagram

The Below given figure shows Use Case Diagram.



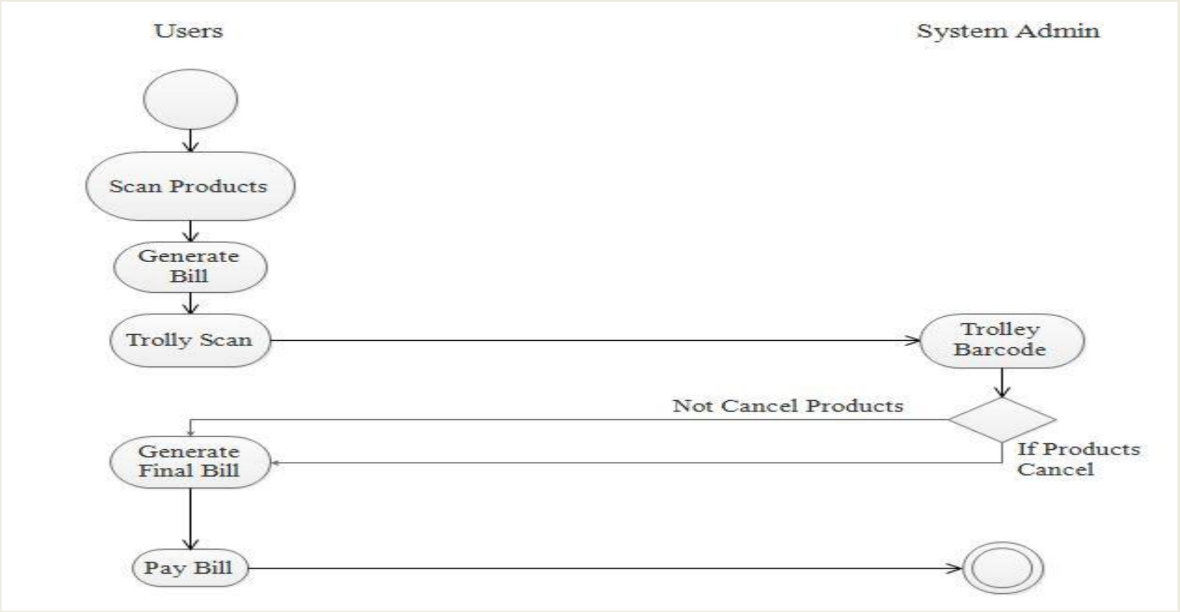
5.2 ER Diagram

The Below given figure shows ER Diagram.



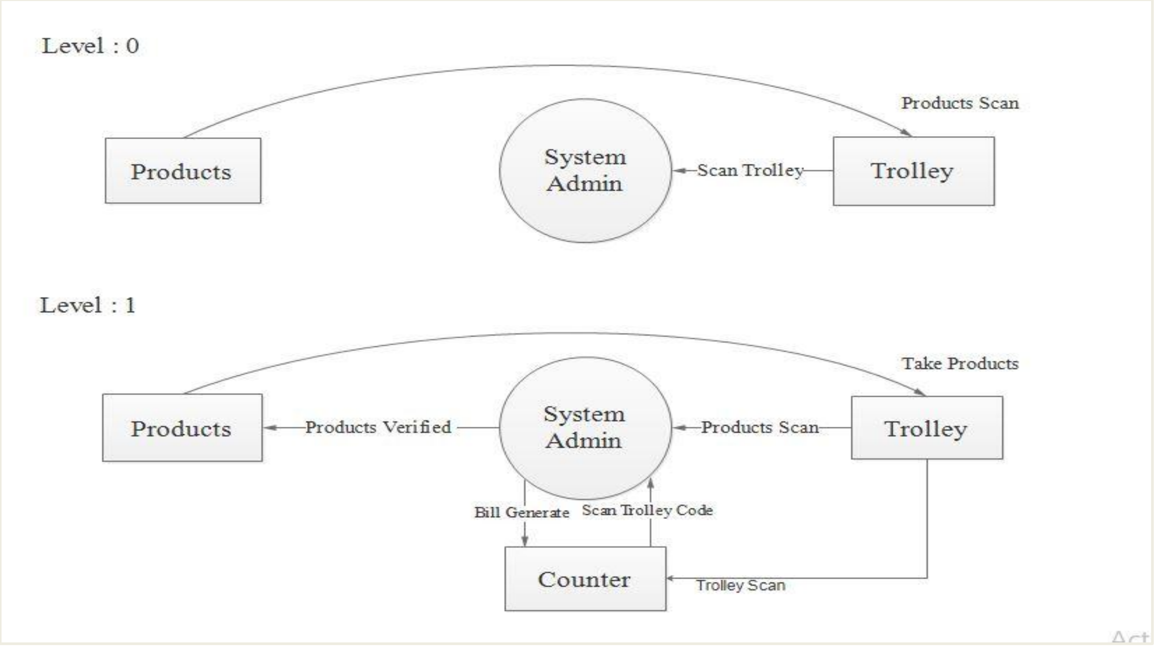
5.3 Activity Diagram

The Below given figure shows Activity Diagram.



5.4 Data flow Diagram

The Below given figure shows Data Flow Diagram.



Chapter: - 6

Implementation

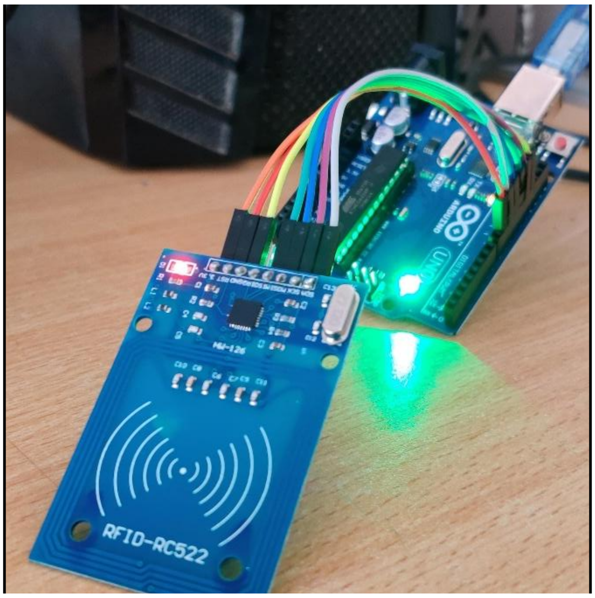


Fig 6.1 (RFID & ARDUINO UNO)

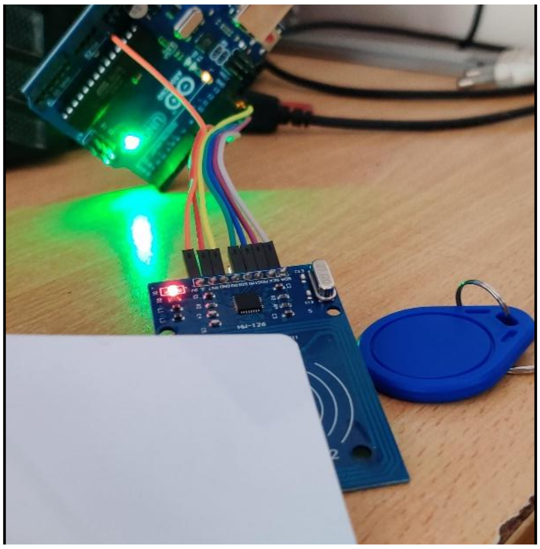
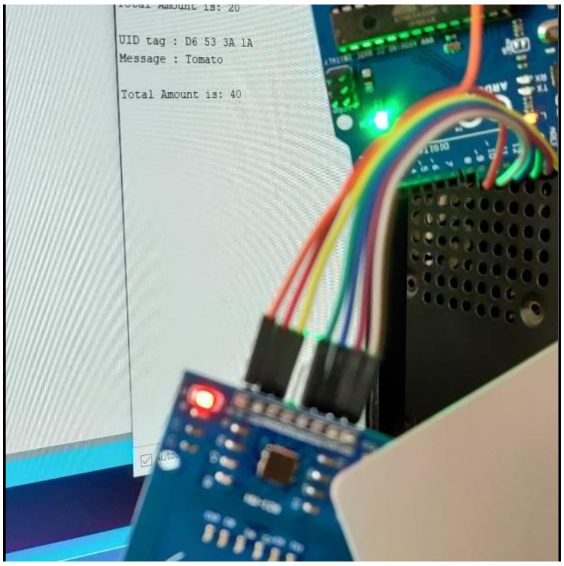


Fig 6. 2 (RFID CardScanning)



```
Total Amount is: 20

UID tag : D6 53 3A 1A
Message : Tomato

Total Amount is: 40
```

Fig 6. 4 (RFID OUTPUT in Computer)

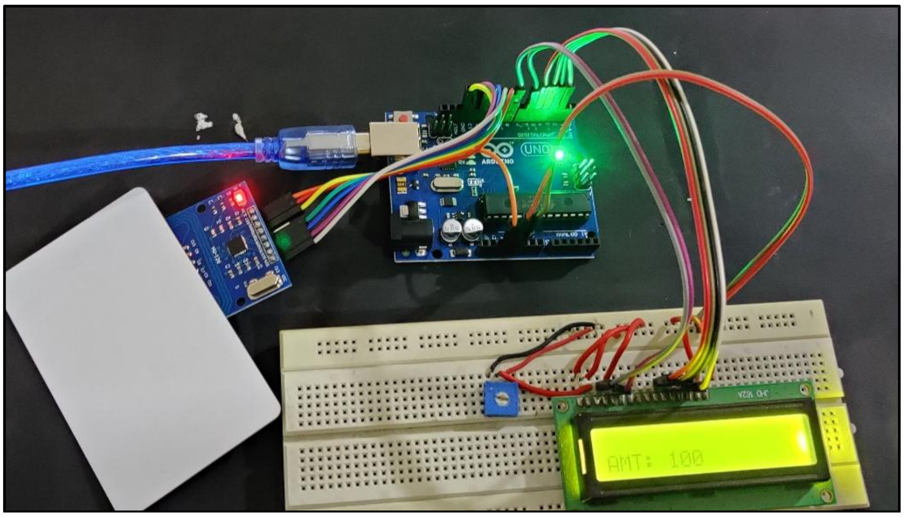


Fig 6. 5 (RFID OUTPUT in LCD)

Chapter: - 7
Conclusion

Taking into account the changing trend in retail shopping, we come to a conclusion that the Intelligent Shopping Basket is most certainly a definite necessity for the Retail marketing industry to step up their portfolios, this project is used in shopping complex for purchase the products. In this project RFID card is used as security access for product. If the product is put in to the trolley means it will shows the amount and also the total amount. But in this project RFID card is used for accessing the products. So, this project improves the security performance and also the speed and cope up with the advancement in technology and save time and manpower.

ACHIEVEMENT

- Reduces manpower required in billing section. This can reduce theexpenses incurred by the management.
- Users can be aware of the total bill amount during the time of purchase.
- Reduces time spent at billing counter and Increases customer satisfaction.

REFERENCE

LINKS

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(2) https://www.electronics-tutorials.ws/combination/comb_2
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