INTRODUCTION:

In the present life most of the people use digital clock in their every day use digital clocks| are made of microcontrollers and also it has good and useful features like good vision, high bright , less weight and portable and it is convenient to place everywhere and the device may not cause any harmful interface by using the 3d digital clock we have more uses we can place that easily in our home ,office etc

COMP0NENTS REQUIRED:

1.Gate sheet

2.4v LED strip

3.Connecting wires

4. 7 way gang box

5. Female header pin

6. 3V Battery

7. 47ohms Resistor

8. 16 pin IC base

9. 28 pin IC base

10. 16MHz crystal

11. Male header pin

12. Arduino UNO

13. IC74HC59

14. DS3231RTC Module

15. Camelion 3v CR2032

16. Glue Gun

17. Gum(Pidilite)

18. Micro USB Socket

19. Push Button Switches

20. 10K Resistor

21. Capacitor

22. ATmega328 Microcontroller.

C0MPONENTS SPECIFICATIONS:

1. GATE SHEET:

The gate sheet used to make the seven segment display.

2. 4V LED STRIP:

The 4V LED strip is used in this project these strip lights had been used solely in accent lighting, back lighting, and task lighting application in digital clock.

4V LED specifications :

1. Voltage: 4v dc supply
2. Colour: white or warm white
3. Power: 35 MA across each chip
4. Led chip: smd 5730
5. Life span: 50,000 hours

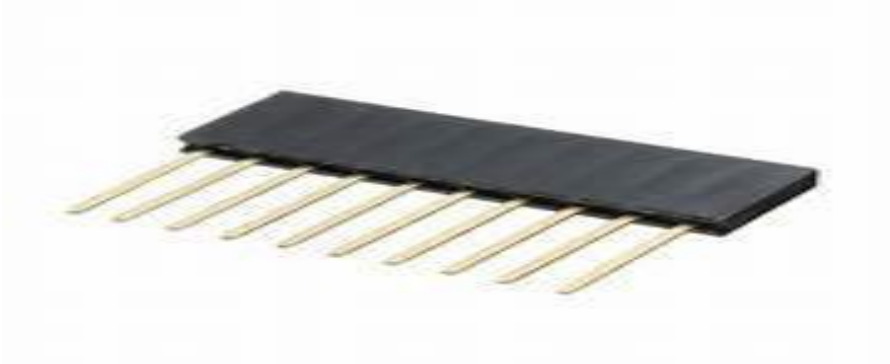
3.CONNECTING WIRES:

The connecting wires are used in digital clock these connecting wires are connected in the 7 way gang box so that the display can work. The main purpose of using this connecting wires is for making proper connections to the circuit. A connecting wires allows travels the electric current from one point to another point without resistivity.

4. 7 WAY GANG BOX:

This 7 way gang box used to they provide the necessary support and safety from direct contact with external objects.

5.FEMALE HEADER PIN:



Specification:

Housing:30%glass filled pvt

Contacts: brass or phosphor bronze

Plating:1*15 per strip

Pin pitch:2.54mm

Mounting: pcb through-hole pins

Gender: female

Break away: no

Contacts:2-40 pins (single row)

6. 3V BATTERY:

3v battery is used in cars, calculators.

SPECIFICATIONS:

1. No of batteries:5 lithium metal batteries
2. Voltage:3 volts

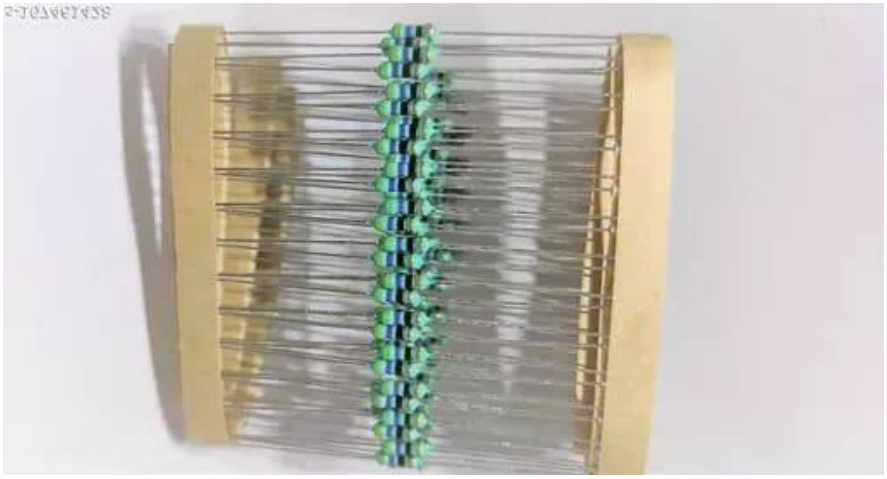
3. Battery weight:10 grams

4. Item dimensions:7.5*2.2*0.1cm

5. Item weight:9 grams

6. CAMELION:CR2032,BP5

7. 47 OHM RESISTOR



Resistors help in eliminate reflections and they help not to degrade to the clock signal.

8. 16 PIN IC BASE:

The IC can be removed from this socket when required this base acts as removable IC.

Specifications:

Contacts: brass contacts with tin

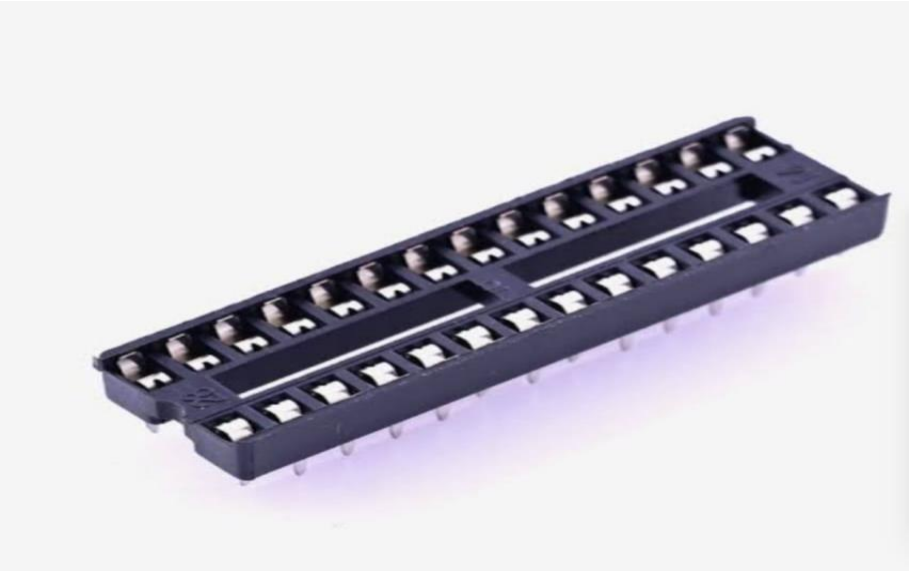
Current Rating : 1A

Insulator: thermoplastic polyster

Colour : black

Diameter: 0.40mm and 0.56mm

9.28 PIN IC BASE:



These help in providing safe removal and insertion of chips.

SPECIFICATIONS:

Over all height above pcb:4.8mm

Pcb hole:0.6mm

Pitch width:7.62mm

Pin pitch:2.54mm

Pins:28

10.16MHZ crystal:

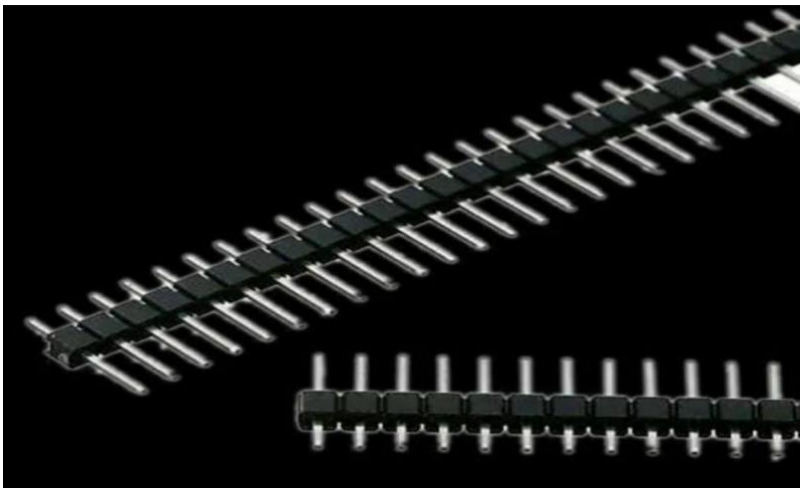
This 16 mhz crystal used to create an oscillating signal at a frequency of 16 mega hertz The signal created by the crystal can be used to keep the track of time or to provide a stable clock signal for digital electronics .16 MHz means there are 16 million clock cycles per second. The 16 MHz crystal use crystals to provide a clock input to your microprocessor. It has high

reliability and low cost and tight stability and extended temperature the crystal oscillator frequency stability refers to the allowable deviation from nominal crystal frequency over a specified range.

Specifications:

Crystal case: SMD
Frequency stability:30ppm
Load capacitence:18pf
Frequency tolerance:30ppm
Height:11.4mm

11. Male header pin:



The male header pin is used to build the project into a bread board solderless or permanent.

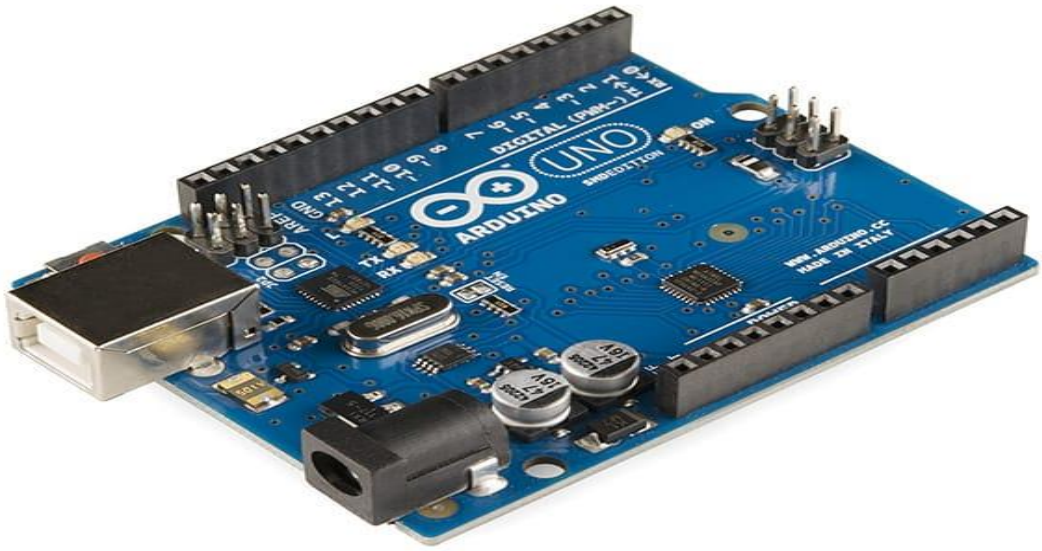
The 2*20 male header pin has the same number and spacing of pins as a raspberry pi but is best served when used in conjunction with the pi zero since they come with a space of unpopulated headers.

Specifications :

Plastic base:2.54mm
Size: pin pitch
No of pins :40 pins
Cuttable: These are easy to be cut to any length if needed. they are suitable for electronic project.

Applications: this connector is widely used in electronic circuit , PCB circuit board.

12. Arduino UNO



Arduino Uno is a low cost flexible and easy to use programmable open source.
Microcontroller board that can integrated into variety of electronics.

Specifications:

Microcontroller: ATmega328p

Input voltage:6-20 volts

Pwn input pins:6

Analog input pins :6

DC current per input pin:20MA

DC current per 3.3 pin :50MA

Flash memory:32kb

SRAM :2 kb

Ee prom: 1 kb

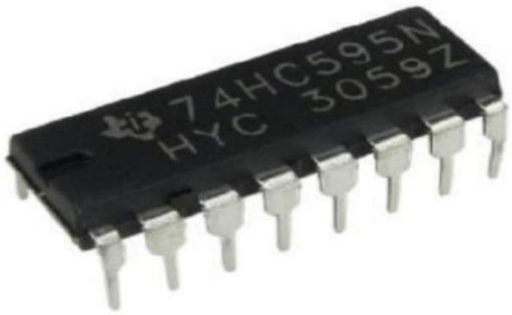
Clock speed: 16mhz

LED: built-in:13

Width:58.4mm

Weight:25 grams

13. 74HC59 Ic:



74H59 is a shift register which works on serial in parallel out protocol it receives data serially from microcontroller.

Specifications

8 bit serial input

8 bit serial or parallel output

Storage register with 3 outputs

Shift register with direct clear

100mhz shift out frequency

14. Ds3231 RTC module

The ds3231 is a low cost high accurate real time clock which can maintain hours minutes seconds as well as day month information.

Specifications:

Operating voltage:2.7-5.5

Voltage supply for RTC:2.2-5.5v

Accuracy:2ppm from 0 c to 40 c

Battery holder:2032 coin battery

12 c interface:fast (400khz)12 c interface

15. Camelion 3v cr2032:

Camelion cr2032 is a lithium button cells battery in car keys caluculators remote controls digital weight indicators electronic scales.

Specifications

No of batteries -5 lithium metal batteries

Voltage -3 volts

Battery weight -10 grams

Item dimensions -7.5×2.2×0.1cm

Item weight -9 grams

Camelion cr2032-Bp5

16. Glue Gun:

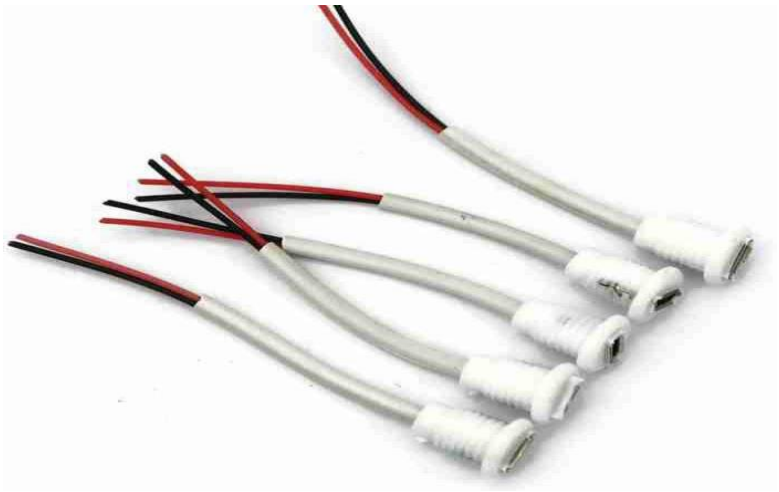
Glue gun they are regarded as a staple in toolkits and used in diy fans trades men craft men and many other professional industries

The hot glue is modulable and peels away easily thus making it ideal for Temporary fixes and we use glue Gun in this project for attaching the Segments and glue gun is very useful in this project

17. Gum (pidilite):

Gum is used for the basic purposes of the project for Attaching the small components and for small attaching Purposes for this we use gum in the project .

18. Micro USB socket :



Micro USB sockets are used for various applications for Powering and charging smaller devices to transmitting Data between them they are often used as fast charging cables connecting smart phones and Other compact devices charger electrical outlets Computer peripherals external hard drives etc. we will use the micro usb socket For this purpose in this project. These Are used to charge small devices. and share the data between them.

19. Push button switches:

A push button switch is a mechanical device used to Control an electrical circuit in which the operator manually presses a Button to actuate an internal switching mechanism they Can either maintain temporary the most frequent sort of Momentary switch is the push button the maintenance Push button switch is linked to a mechanism that alternates Between holding and releasing with the successive pushes. Operating part relays the external operating force to the switch unit.

Mounting part: this is the part that secures the switch to the panel.

20. 10k resistor:

10k resistor commonly used in bread boards and other prototyping applications these 10 k resistor make excellent Pull ups and pull downs and current limiters these thick lead Of resistors fit snugly into bread board with very little moment So you should have few to no issues using them in your next Project

Provides electrical resistance : it limits the flow of the electrons through the circuit

The colour code of 10k ohm resistor is brown, black, orange, golden.

The voltage is used in 10k ohm resistor is 50 volts

21. Capacitor:

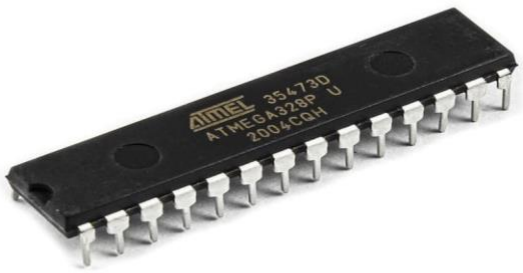
Capacitor have many uses in electronic and electrical applications capacitor allow only AC signals to pass when They charged blocked DC signals the main components of Filters are

capacitors they supply energy to the circuit when ever available these are long service and low maintenance.

It can quickly deliver stored energy

Capacitors are also used to maintain the voltage at a certain level

22. AT MEGA 3280 Microcontroller:



1.At mega3280 is the microcontroller used in basic Arduino boards ie
Arduino Uno and Arduino pro mini and Arduino Nano
2. It has EEPROM memory of 1kb and it's sramis 2kb
3.it has 8 pins for Adc operatons which all combine to form a port A
4.it also have 3 built in timers two of them are 8 bit timers and Other one is 16 bit timer.
5.it operates ranging from 3.3v to 5.5v but we use 5v as the Standard
6.its excellent features areinclude low cost , efficiency, and low Power dissipation programming lock for security purposes Real timer counter with separate oscillators
7.its normally used in embedded system applications we can design all of them by using this microcontroller.
8.This empowers system designer to optimize the device for power consumption versus processing Speed.
9.The popular microcontroller due to it being a major component in the android board products.

10.it is high performance low power and 8 bit microcontroller family

11.The number 328 is for 32 kb code space, and the last digit 8 for 8 bit architechture and p is the pico power

The following table shows the complete features of Atmega micro controller

No of pins	28
Cpu	RISC 8 bit AVR
Operating voltage	1.8to 5.5 v
Program memory	32 kb
Program memory type	Flash
Sram	2048 bytes
EEpRom	1024 bytes
ADc	10-bit
No of ADc channel	8
Pwn pins	6
Comparator	1
Packages	8pin pdip 32 lead TQFP 28pad QFN
Oscillator	Upto 20mhz
Timer	8 bitx2
Enhanced power on reset	Yes
Power up timer	Yes
I/o pims	28
Manufacturer	Micro chip
SpI	Yes
12c	
Watchdog timer	Yes
Brown out detect	Yes
Reset	Yes
Usi	Yes
Minimum operating temperature	-44 to +85 c

PROGRAM CODE :

```
** The Electronics Adda ***

#include <Wire.h>

#include "RTClib.h"

const int  g_pinData = 4;

const int  g_pinCommLatch = 3;

const int  g_pinClock = 2;

const int  ledPin = 8;

RTC_DS1307 RTC;



int P1 = A1; // Button SET MENU'

int P2 = A2; // Button +

int P3 = A0; // Button -



int hourupg;

int minupg;

int yearupg;

int monthupg;

int dayupg;

int menu = 0;



byte g_digits [10];
```

```
// Current number being displayed

int g_numberToDisplay = 0;



// Number of shift registers in use

const int g_registers = 4;



// Array of numbers to pass to shift registers

byte g_registerArray [g_registers];



void setup()

{



  Wire.begin();

  RTC.begin();



  pinMode(P1, INPUT);

  pinMode(P2, INPUT);

  pinMode(P3, INPUT);

  int menu = 0;



  // Only set the time on compile if the RTC is not running...

  if ( !RTC.isrunning()) {

    Serial.println("RTC is NOT running!");

    // following line sets the RTC to the date & time this sketch was compiled
```

```
  RTC.adjust(DateTime(__DATE__, __TIME__));
}



pinMode (g_pinCommLatch, OUTPUT);
pinMode (g_pinClock, OUTPUT);
pinMode (g_pinData, OUTPUT);
pinMode (ledPin, OUTPUT);



Serial.begin (57600);



int a = 1, b = 2, c = 4, d = 8, e = 16, f = 32, g = 64;



g_digits [0] = a + b + c + d + e + f;
g_digits [1] = b + c;
g_digits [2] = a + b + g + e + d;
g_digits [3] = a + b + g + c + d;
g_digits [4] = f + g + b + c;
g_digits [5] = a + f + g + c + d;
g_digits [6] = a + f + g + c + d + e;
g_digits [7] = a + b + c;
g_digits [8] = a + b + c + d + e + f + g;
g_digits [9] = a + b + c + d + g + f;



int hour, minute, sec;
```

```
 DateTime now = RTC.now();



 hour = now.hour();
 minute = now.minute();
 sec = now.second();
 hourupg = hour;
 minupg = minute;
}


void sendSerialData (
 byte registerCount,  // How many shift registers?
 byte *pValueArray)   // Array of bytes with LSByte in array [0]
{
 // Signal to the 595s to listen for data
 digitalWrite (g_pinCommLatch, LOW);



 for (byte reg = registerCount; reg > 0; reg--)
 {
  byte value = pValueArray [reg - 1];



  for (byte bitMask = 128; bitMask > 0; bitMask >>= 1)
  {
   digitalWrite (g_pinClock, LOW);
   digitalWrite (g_pinData, value & bitMask ? HIGH : LOW);
```

```
    digitalWrite (g_pinClock, HIGH);
   }
  }
  // Signal to the 595s that I'm done sending
  digitalWrite (g_pinCommLatch, HIGH);


}


void loop()
{
  int hour, minute, sec, disp = 0;


  DateTime now = RTC.now();


  hour = now.hour();
  minute = now.minute();
  sec = now.second();
  if (menu == 0)
  {
   hourupg = hour;
   minupg = minute;


  }
  else
  {
```

```
 }
disp = (hourupg * 100) + minupg;
 g_numberToDisplay = disp;


 if (g_numberToDisplay < 10)
 {
  g_registerArray [0] = g_digits [0];
  g_registerArray [1] = g_digits [0];
  g_registerArray [2] = g_digits [0];
  g_registerArray [3] = g_digits [g_numberToDisplay];
 }
 else if (g_numberToDisplay < 100)
 {
  g_registerArray [0] = g_digits [0];
  g_registerArray [1] = g_digits [0];
  g_registerArray [2] = g_digits [g_numberToDisplay / 10];
  g_registerArray [3] = g_digits [g_numberToDisplay % 10];
 }
 else if (g_numberToDisplay < 1000)
 {
  g_registerArray [0] = g_digits [0];
  g_registerArray [1] = g_digits [g_numberToDisplay / 100];
  g_registerArray [2] = g_digits [(g_numberToDisplay % 100) / 10];
  g_registerArray [3] = g_digits [g_numberToDisplay % 10];
 }
```

```
else
{
 g_registerArray [0] = g_digits [g_numberToDisplay / 1000];
 g_registerArray [1] = g_digits [(g_numberToDisplay % 1000) / 100];
 g_registerArray [2] = g_digits [(g_numberToDisplay % 100) / 10];
 g_registerArray [3] = g_digits [g_numberToDisplay % 10];
}

sendSerialData (g_registers, g_registerArray);
// Blink the LED to indicate seconds




Serial.print(menu);



if (menu == 1)
{
 DisplaySetHour();
}
if (menu == 2)
{
 DisplaySetMinute();
```

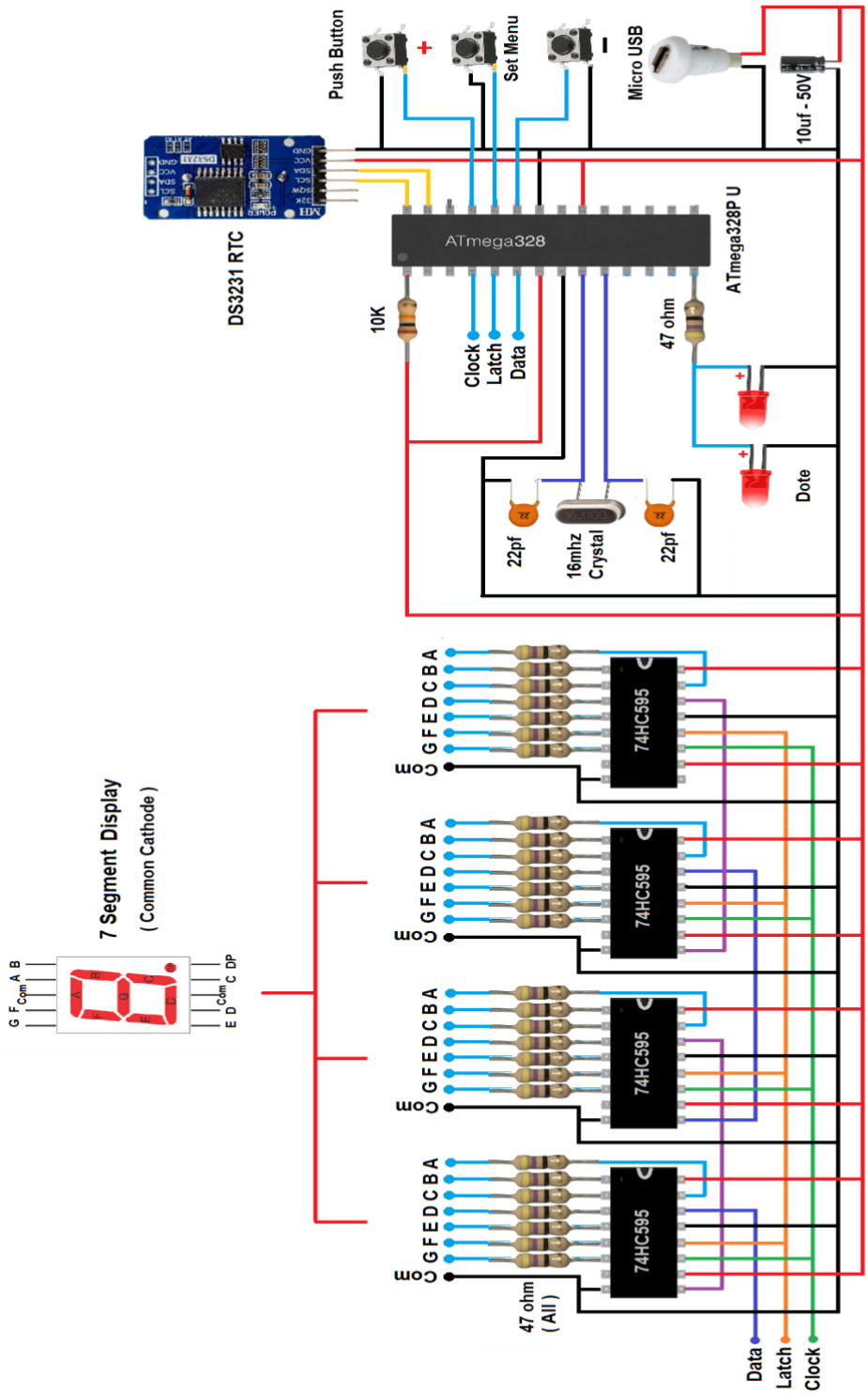
```
  Serial.print("min");
 }
 if (menu == 3)
 {
  StoreAgg();
  delay(500);
  menu = 0;



 }
 if (digitalRead(P1))
 {
  menu = menu + 1;
 }
 if (menu == 0)
 {
  digitalWrite(ledPin, HIGH);
  delay(500);
  digitalWrite(ledPin, LOW);
  delay(500);
 }
 else
 {
  delay(500);
 }
} // loop
```

```
void DisplayDateTime()
{




}

void DisplaySetHour()
{


 if (digitalRead(P2) == HIGH)
 {
  if (hourupg == 23)
  {
   hourupg = 0;
  }
  else
  {
   hourupg = hourupg + 1;
  }
 }
 if (digitalRead(P3) == HIGH)
 {
  if (hourupg == 0)
  {
   hourupg = 23;
```

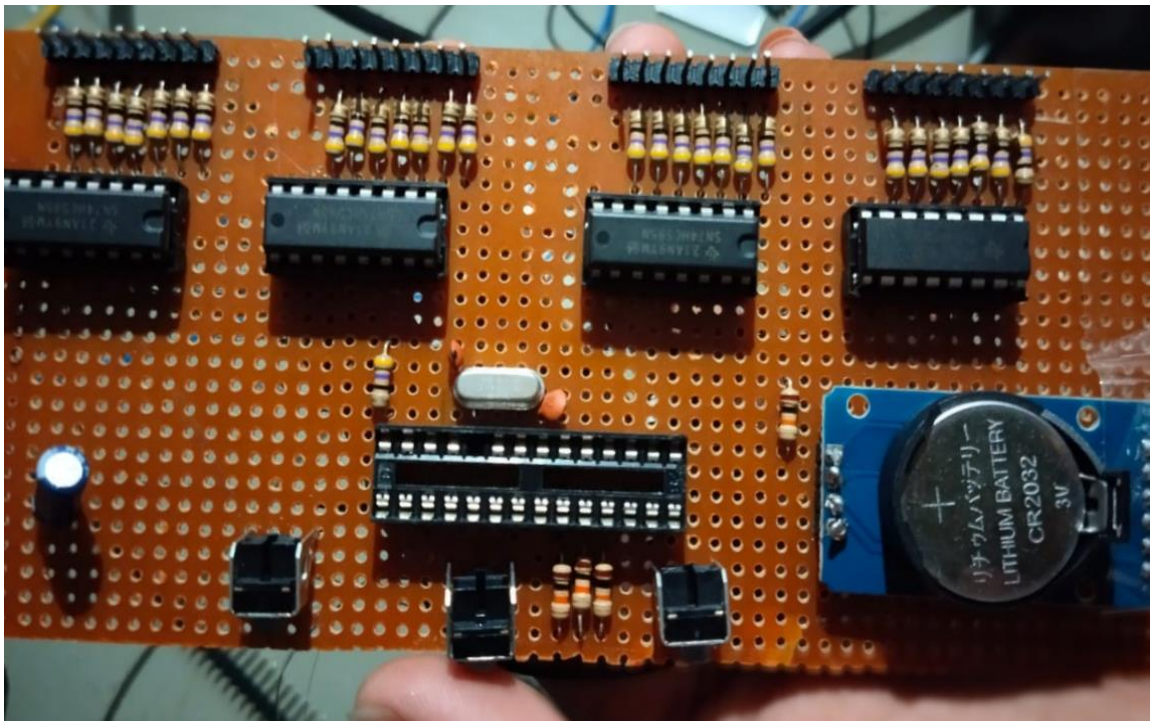
```
    }
    else
    {
      hourupg = hourupg - 1;
    }
  }



}

void DisplaySetMinute()
{
  // Setting the minutes


  if (digitalRead(P2) == HIGH)
  {
    if (minupg == 59)
    {
      minupg = 0;
    }
    else
    {
      minupg = minupg + 1;
    }
  }
```

```
 if (digitalRead(P3) == HIGH)
 {
  if (minupg == 0)
  {
    minupg = 59;
  }
  else
  {
    minupg = minupg - 1;
  }
 }
}


void StoreAgg()
{
 RTC.adjust(DateTime(yearupg, monthupg, dayupg, hourupg, minupg, 0));
 delay(200);
 menu = 0;
}
```

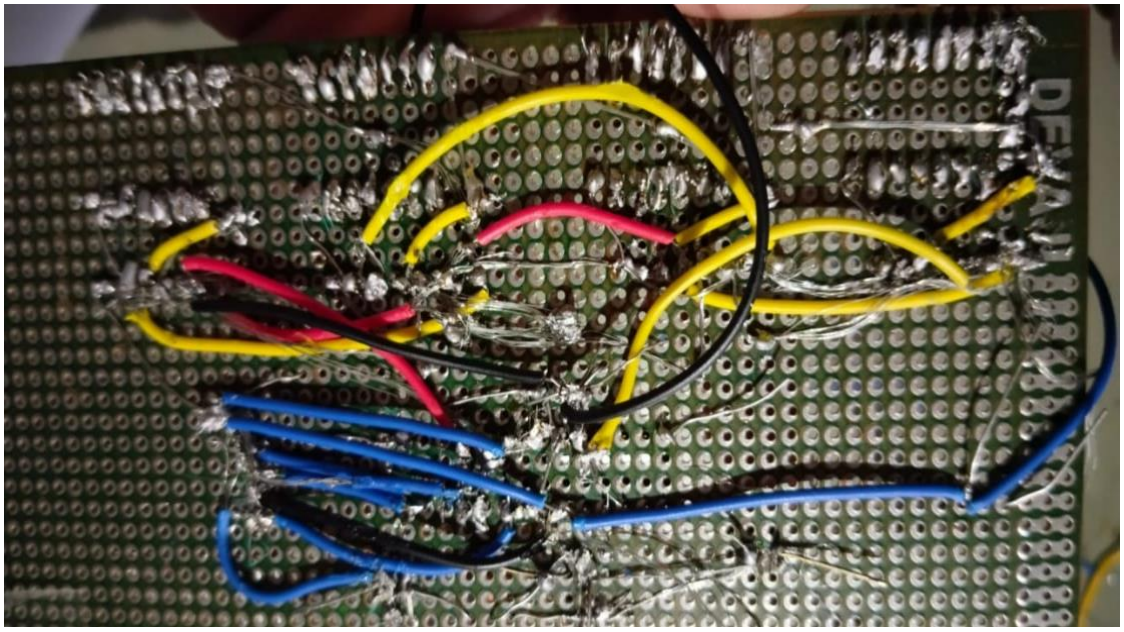
Circuit Diagram :



Circuit designing frames:



Soldering part:



Advantages:

1.Inexpensive and extremely popular and Simple structured.

2.Since they share common cathodes and anodes they can be driven by single they can driven by single IC.

3. The driver IC's can sink or source current from a microcontroller output pin which,

4. Makes them easy to interface to microcontroller in digital system.

5. A large number of Leads in each digit means that they can be easily read at a distance or in low light.

6. Only four signal lines are required to control each digit this makes them easier to implement.

7.It consumes little power making it appropriate for battery -driven devices such as calculators.

8. It is easy to distinguish between numerals and other alphabets and symbols.

9. Cost of entire module of seven segment display is very cheap as it only contains LEDs.

10. Efficiency: LED displays in general are extremely efficient.

11. Heat dissipation: The heat dissipated from these displays is very less and that increases the Life of the devices.

12. Diodes are the one of the most simple electrical components, and they are extremely easy to make.

13. Since the seven segment circuit is so simple,
There is a decreased risk of circuit malfunction due to component failure

14. Diode dissipate very little energy.

15.There is very little regulation in terms of making LEDs, excluding the environmental regulations regarding pollution and it is therefore Easy to find a manufacturer that produces substandard LEDs

References:

Using the 7 segment display

For a single digit you will need a 8 microcontroller GPIO Pins each pin should be connected to single segment.

Through a resistor and the common pin is connected to 5v (or Gnd if you are using the common cathode Varient) you can spare one pin (DP)if you don't use the Dot Led

These references you can take from the 3d digital clock

Pin names

Name	Description
A	Top segment
B	Top-right segment
C	Bottom right segment
D	Bottom segment
E	Bottom left segment
F	Top left segment
G	Middle segment
DP	Dot LED
COM	Common pin*
DIG 1	Digit 1pin*
DIG 2	Digit 2pin*
DIG3	Digit 3 pin*
DIG 4	Digit pin 4*
CLN	Colon pin(optional)

*COM is the common pin for a single digit 7-segment Display for multi digit displays use dig 1...dig 4 With the default common attribute settings of anode

The segment pins(A...G,DP,CLN) are connected to the Cathode (negative side)of the LEDs and the common pin are connected to the anode(positive side)of the LEDs.Segments are lit by driving their pins low . setting common to cathode reverse it behaviour with segment Pins turning on when high.

Methodology:

In this type of display all anode connection of the LED segment to join logic 1 illuminating individual components occurs by applying a ground logic and also known as LOW or Logic0. This process happens via an Emitter follower or a voltage current Collector to cathode of a particular Segment.

Seven segment displays may use a liquid crystal display(LCD), a light emitting diode (LED) for each segment, an electro- chromic, or other light generating or controlling techniques such as cold cathode gas discharge (panaplex) , vaccum fluorescent (VFD) incandescent filaments (numitrion),and others.

Conclusion:

Seven segment displays are commonly Used in low power electronics devices Like remote controls, watches, clocks And digit measuring instruments etc . From above disscussion we can conclude that a seven segment display Consist of seven LED (light emitting diode) segments are illuminated in a Pattern to display the number from 0 to 9. Seven segment displays are used to display some basic characters.

Final prototype: