

# Standalone ATMEGA328P from Arduino

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### 1 COMPONENTS

Component	Value	Quantity
Resistor	220 Ohm	3
	10K Ohm	1
Capacitor	10 uF	2
	22 pF	2
Regulator	7805	1
Crystal	16 Mhz	1
ATMEGA328P		1
Seven Segment Display		1
LED		2

TABLE 1.0

### 2 SOFTWARE

Run the following program on the arduino.

```
// Declarations
int A=0,B=0,C=0,D=0,a,b,c,d,e,f,g,
W,X,Y,Z,i,j,thisPin;
int ledPins
[]={2,3,4,5,6,7,8,9,10};
int pinCount=9;
int r0;
```

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```
unsigned int initialtime , elapsed;
void showit(int x);

void setup()
{
//Declaring output pins
for( thisPin=0;thisPin < pinCount;
thisPin++)
{
pinMode(ledPins[thisPin], OUTPUT);
}
}

void loop()
{
//Decade Counting
for( r0=0;r0<=9;r0++)
{
initialtime=millis();
//Counting 1000 milliseconds
for(elapsed=0;elapsed<=1000;
elapsed=millis()-initialtime)
{
//Keep display on
digitalWrite(9,HIGH);

//Write number to display
showit(r0);

} //end counting 10 sec
} //end counting 1 sec
} // end void

//Display logic
void showit(int x)
{
int D,C,B,A;

//Decimal to Binary conversion
A=x%2;
x=x/2;
```

```

B=x%2;
x=x/2;
C=x%2;
x=x/2;
D=x%2;

//BCD to seven segment decoder
a = (!D&&!C&&!B&&A) || (!D&&C&&!B&&!A)
;
b = (!D&&C&&!B&&A) || (!D&&C&&B&&!A) ;
c = (!D&&!C&&B&&!A) ;
d = (!D&&!C&&!B&&A) || (!D&&C&&!B&&!A)
|| (!D&&C&&B&&A) ;
e = (!D&&!C&&!B&&A) || (!D&&!C&&B&&A)
|| (!D&&C&&!B&&!A) || (!D&&C&&B&&A)
) || (!D&&C&&B&&A) || (D&&!C&&!B&&A)
;
f = (!D&&!C&&!B&&A) || (!D&&!C&&B&&!A)
|| (!D&&!C&&B&&A) || (!D&&C&&B&&A) ;
g = (!D&&!C&&!B&&A) || (!D&&!C&&B&&A)
) || (!D&&C&&B&&A) ;

// Writing to display
digitalWrite (2 , a);
digitalWrite (3 , b);
digitalWrite (4 , c);
digitalWrite (5 , d);
digitalWrite (6 , e);
digitalWrite (7 , f);
digitalWrite (8 , g);
}
    
```

### 3 HARDWARE SETUP

**Problem 3.1.** Take the ATMEGA328P IC from the Arduino board and plug it into the breadboard.

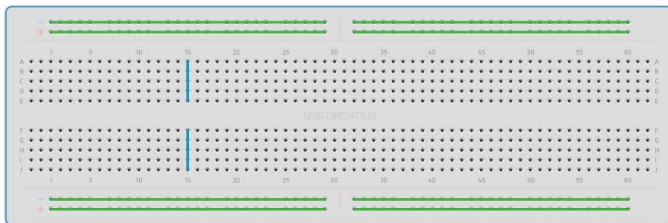


Fig. 3.1

**Problem 3.2.** Plug the Quartz crystal between pins 9 and 10 of the ATMEGA328P.

**Problem 3.3.** Connect the 22pF capacitors from pin 9 and 10 to GND.

**Problem 3.4.** Connect the pin 1 through a 10 KΩ resistor to 5V.

**Problem 3.5.** Connect one end of the push button to pin 1 and the other end to GND.

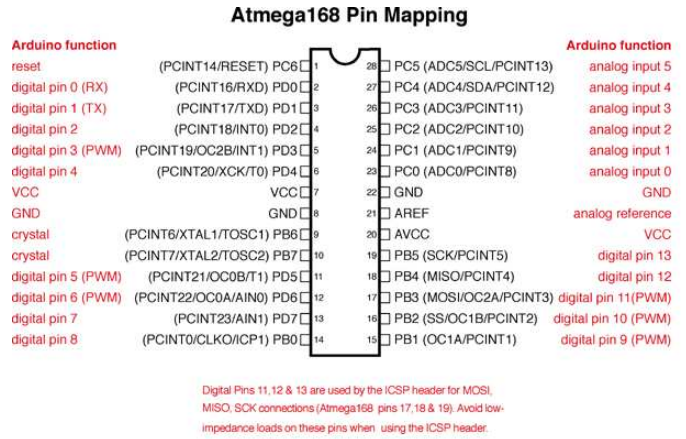


Fig. 3.5

**Problem 3.6.** Make connections according to Table 3.6.

Type	Pin No
5V	7
	20
	21
GND	8
	22
a	4
b	5
c	6
d	11
e	12
f	13
g	14

TABLE 3.6

**Problem 3.7.** Power up through USB.