

**Práctica #7 Contador 0-99**  
**Introducción a los Microcontroladores**  
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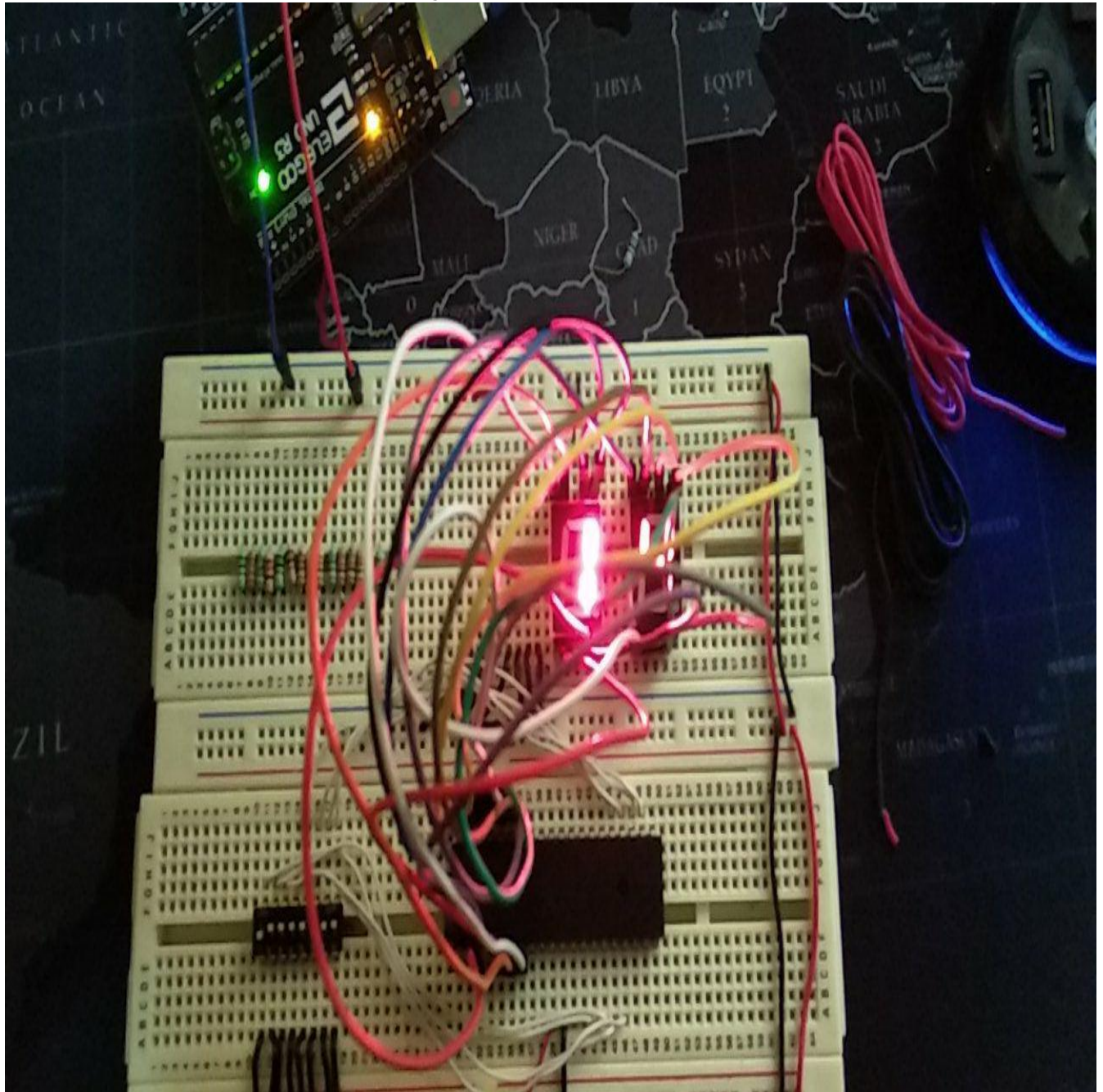
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## 1. ProtoBoard

Figura 1: ProtoBoard



## 2. Código

```
1 #include <io.h>
2 #include <delay.h>
3 #define boton PIND.0
4
5 bit botonp;
6 bit botona;
7 unsigned char unidades;
8 unsigned char decenas;
9 const char tabla7segmentos [10]={0x3f, 0x06, 0x5b, 0x4f, 0x66, 0x6d, 0x7d, 0x07, 0x7f, 0x6f};
10
11 void main(void){
12
13     // Input/Output Ports initialization
14     // Port A initialization
15     // Function: Bit7=Out Bit6=Out Bit5=Out Bit4=Out Bit3=Out Bit2=Out Bit1=Out Bit0=Out
16     DDRA=(1<<DDA7) | (1<<DDA6) | (1<<DDA5) | (1<<DDA4) | (1<<DDA3) | (1<<DDA2) | (1<<DDA1) | (1<<DDA0);
17     // State: Bit7=0 Bit6=0 Bit5=0 Bit4=0 Bit3=0 Bit2=0 Bit1=0 Bit0=0
18     PORTA=(0<<PORTA7) | (0<<PORTA6) | (0<<PORTA5) | (0<<PORTA4) | (0<<PORTA3) | (0<<PORTA2) | (0<<PORTA1) |
19         (0<<PORTA0);
20
21     // Port B initialization
22     // Function: Bit7=Out Bit6=Out Bit5=Out Bit4=Out Bit3=Out Bit2=Out Bit1=Out Bit0=Out
23     DDRB=(1<<ddb7) | (1<<ddb6) | (1<<ddb5) | (1<<ddb4) | (1<<ddb3) | (1<<ddb2) | (1<<ddb1) | (1<<ddb0);
24     // State: Bit7=0 Bit6=0 Bit5=0 Bit4=0 Bit3=0 Bit2=0 Bit1=0 Bit0=0
25     PORTB=(0<<PORTB7) | (0<<PORTB6) | (0<<PORTB5) | (0<<PORTB4) | (0<<PORTB3) | (0<<PORTB2) | (0<<PORTB1) |
26         (0<<PORTB0);
27
28     // Port C initialization
29     // Function: Bit7=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
30     DDRC=(0<<DDC7) | (0<<DDC6) | (0<<DDC5) | (0<<DDC4) | (0<<DDC3) | (0<<DDC2) | (0<<DDC1) | (0<<DDC0);
31     // State: Bit7=T Bit6=T Bit5=T Bit4=T Bit3=T Bit2=T Bit1=T Bit0=T
32     PORTC=(0<<PORTC7) | (0<<PORTC6) | (0<<PORTC5) | (0<<PORTC4) | (0<<PORTC3) | (0<<PORTC2) | (0<<PORTC1) |
33         (0<<PORTC0);
34
35     // Port D initialization
36     // Function: Bit7=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
37     DDRD=(0<<DDD7) | (0<<DDD6) | (0<<DDD5) | (0<<DDD4) | (0<<DDD3) | (0<<DDD2) | (0<<DDD1) | (0<<DDD0);
38     // State: Bit7=P Bit6=P Bit5=P Bit4=P Bit3=P Bit2=P Bit1=P Bit0=P
39     PORTD=(1<<PORTD7) | (1<<PORTD6) | (1<<PORTD5) | (1<<PORTD4) | (1<<PORTD3) | (1<<PORTD2) | (1<<PORTD1) |
40         (1<<PORTD0);
41
42     while (1){
43         if (boton==0)
44             botona=0;
45         else
46             botona=1;
47         //Cambio de flanco de 1 a 0
48         if ((botonp==1)&&(botona==0)){
49             unidades++;
50             //Autoincremento de las unidades
51             if (unidades==10){
52                 unidades=0;
53                 decenas++;
54             }
55             if(decenas==10)
56                 decenas=0;
57             //Retardo de 40 ms para quitar rebote
58             delay_ms(40);
59         }
60     }
```

```
56      //Cambio de flanco de 0 a 1
57      if ((botonp==0)&&(botona==1))
58          delay_ms(40);
59          //Retardo de 40mS para quitar rebote
60      PORTB=tabla7segmentos [unidades];
61      PORTA=tabla7segmentos [decenas];
62      botonp=botona;
63  }
64 }
```

### 3. Circuito

Figura 2: Simulación

