Instituto Politécnico Nacional

Escuela Superior de Computo

Materia:

Introducción a los microcontroladores.

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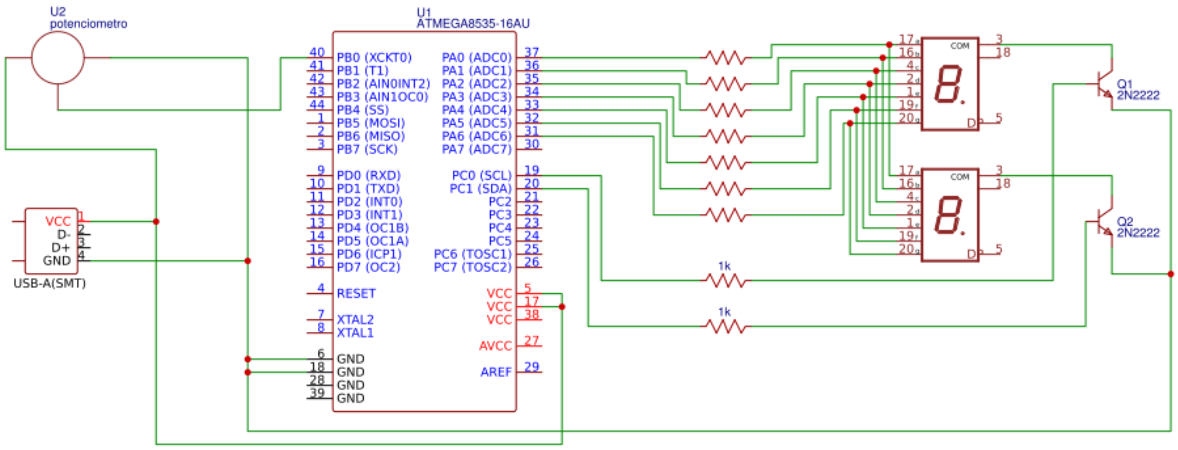
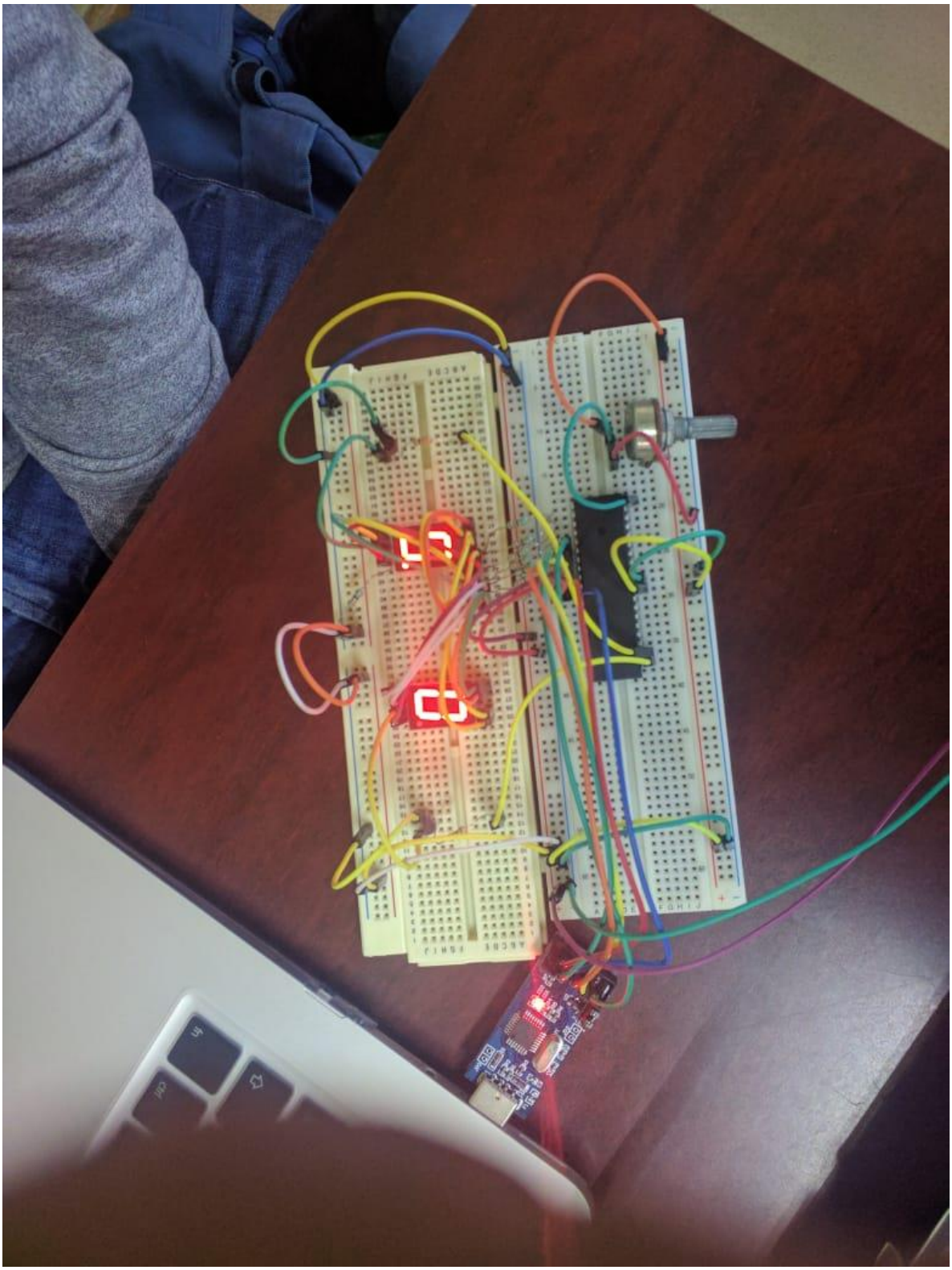
Practica N°15

Volmetro



TITLE: Practica 16		REV: 1.0
	Company: ESCOM	Sheet: 1/1
	Date: 2019-03-21 Drawn By: Equipo 4	



```
/*****************************************************
This program was created by the
CodeWizardAVR V2.60 Evaluation
Automatic Program Generator
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Project :
Version :
Date    : 04/03/2019
Author  : Equipo 4
Company :
Comments:


Chip type               : ATmega8535L
Program type            : Application
AVR Core Clock frequency: 1,000000 MHz
Memory model            : Small
External RAM size       : 0
Data Stack size         : 128
*****************************************************/

#include <mega8535.h>

#include <delay.h>

// Declare your global variables here

#define ADC_VREF_TYPE ((0<<REFS1) | (1<<REFS0) | (1<<ADLAR))

// Read the 8 most significant bits
// of the AD conversion result


const char tab7seg[10]={0x3f,0x06,0x5b,0x4f,0x66,0x6d,0x7c,0x07,0x7f,0x6f};
#define C0 PORTC.0
#define C1 PORTC.1

unsigned char cn;
unsigned char decenas;
unsigned char unidades;

unsigned char read_adc(unsigned char adc_input)
{
ADMUX=adc_input | ADC_VREF_TYPE;
// Delay needed for the stabilization of the ADC input voltage
delay_us(10);
// Start the AD conversion
ADCSRA|=(1<<ADSC);
// Wait for the AD conversion to complete
while ((ADCSRA & (1<<ADIF))==0);
ADCSRA|=(1<<ADIF);
return ADCH;
}

void main(void)
{
// Declare your local variables here

// Input/Output Ports initialization
```

```
// Port A initialization
// Function: Bit7=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
DDRA=(0<<DDA7) | (0<<DDA6) | (0<<DDA5) | (0<<DDA4) | (0<<DDA3) | (0<<DDA2) | (0<<DDA1) | (0<<DDA0);
// State: Bit7=T Bit6=T Bit5=T Bit4=T Bit3=T Bit2=T Bit1=T Bit0=T
PORTA=(0<<PORTA7) | (0<<PORTA6) | (0<<PORTA5) | (0<<PORTA4) | (0<<PORTA3) | (0<<PORTA2) | (0<<PORTA1) | (0<<PORTA0);

// Port B initialization
// Function: Bit7=Out Bit6=Out Bit5=Out Bit4=Out Bit3=Out Bit2=Out Bit1=Out Bit0=Out
DDRB=(1<<DDB7) | (1<<DDB6) | (1<<DDB5) | (1<<DDB4) | (1<<DDB3) | (1<<DDB2) | (1<<DDB1) | (1<<DDB0);
// State: Bit7=0 Bit6=0 Bit5=0 Bit4=0 Bit3=0 Bit2=0 Bit1=0 Bit0=0
PORTB=(0<<PORTB7) | (0<<PORTB6) | (0<<PORTB5) | (0<<PORTB4) | (0<<PORTB3) | (0<<PORTB2) | (0<<PORTB1) | (0<<PORTB0);

// Port C initialization
// Function: Bit7=Out Bit6=Out Bit5=Out Bit4=Out Bit3=Out Bit2=Out Bit1=Out Bit0=Out
DDRC=(1<<DDC7) | (1<<DDC6) | (1<<DDC5) | (1<<DDC4) | (1<<DDC3) | (1<<DDC2) | (1<<DDC1) | (1<<DDC0);
// State: Bit7=0 Bit6=0 Bit5=0 Bit4=0 Bit3=0 Bit2=0 Bit1=0 Bit0=0
PORTC=(0<<PORTC7) | (0<<PORTC6) | (0<<PORTC5) | (0<<PORTC4) | (0<<PORTC3) | (0<<PORTC2) | (0<<PORTC1) | (0<<PORTC0);

// Port D initialization
// Function: Bit7=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
DDRD=(0<<DDD7) | (0<<DDD6) | (0<<DDD5) | (0<<DDD4) | (0<<DDD3) | (0<<DDD2) | (0<<DDD1) | (0<<DDD0);
// State: Bit7=T Bit6=T Bit5=T Bit4=T Bit3=T Bit2=T Bit1=T Bit0=T
PORTD=(0<<PORTD7) | (0<<PORTD6) | (0<<PORTD5) | (0<<PORTD4) | (0<<PORTD3) | (0<<PORTD2) | (0<<PORTD1) | (0<<PORTD0);

// Timer/Counter 0 initialization
// Clock source: System Clock
// Clock value: Timer 0 Stopped
// Mode: Normal top=0xFF
// OC0 output: Disconnected
TCCR0=(0<<WGM00) | (0<<COM01) | (0<<COM00) | (0<<WGM01) | (0<<CS02) | (0<<CS01) | (0<<CS00);
TCNT0=0x00;
OCR0=0x00;

// Timer/Counter 1 initialization
// Clock source: System Clock
// Clock value: Timer1 Stopped
// Mode: Normal top=0xFFFF
// OC1A output: Disconnected
      // OC1B output: Disconnected
      // Noise Canceler: Off
      // Input Capture on Falling Edge
      // Timer1 Overflow Interrupt: Off
      // Input Capture Interrupt: Off
      // Compare A Match Interrupt: Off
      // Compare B Match Interrupt: Off
      TCCR1A=(0<<COM1A1) | (0<<COM1A0) | (0<<COM1B1) | (0<<COM1B0) | (0<<WGM11) | (0<<WGM10);
      TCCR1B=(0<<ICNC1) | (0<<ICES1) | (0<<WGM13) | (0<<WGM12) | (0<<CS12) | (0<<CS11) | (0<<CS10);
      TCNT1H=0x00;
```

```
110.       TCNT1L=0x00;
111.       ICR1H=0x00;
112.       ICR1L=0x00;
113.       OCR1AH=0x00;
114.       OCR1AL=0x00;
115.       OCR1BH=0x00;
116.       OCR1BL=0x00;
117.
118.       // Timer/Counter 2 initialization
119.       // Clock source: System Clock
120.       // Clock value: Timer2 Stopped
121.       // Mode: Normal top=0xFF
122.       // OC2 output: Disconnected
123.       ASSR=0<<AS2;
124.       TCCR2=(0<<WGM20) | (0<<COM21) | (0<<COM20) | (0<<WGM21) | (0<<CS22) | (0<<
    CS21) | (0<<CS20);
125.       TCNT2=0x00;
126.       OCR2=0x00;
127.
128.       // Timer(s)/Counter(s) Interrupt(s) initialization
129.       TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) |
    (0<<TOIE1) | (0<<OCIE0) | (0<<TOIE0);
130.
131.       // External Interrupt(s) initialization
132.       // INT0: Off
133.       // INT1: Off
134.       // INT2: Off
135.       MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
136.       MCUCSR=(0<<ISC2);
137.
138.       // USART initialization
139.       // USART disabled
140.       UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (0<<RXEN) | (0<<TXEN) | (0<<U
    CSZ2) | (0<<RXB8) | (0<<TXB8);
141.
142.       // Analog Comparator initialization
143.       // Analog Comparator: Off
144.       ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) |
    (0<<ACIS1) | (0<<ACIS0);
145.
146.       // ADC initialization
147.       // ADC Clock frequency: 500,000 kHz
148.       // ADC Voltage Reference: AVCC pin
149.       // ADC High Speed Mode: Off
150.       // ADC Auto Trigger Source: ADC Stopped
151.       // Only the 8 most significant bits of
152.       // the AD conversion result are used
153.       ADMUX=ADC_VREF_TYPE;
154.       ADCSRA=(1<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) | (0<<AD
    PS2) | (0<<ADPS1) | (1<<ADPS0);
155.       SFIOR=(1<<ADHSM) | (0<<ADTS2) | (0<<ADTS1) | (0<<ADTS0);
156.
157.       // SPI initialization
158.       // SPI disabled
159.       SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA)
    | (0<<SPR1) | (0<<SPR0);
160.
161.       // TWI initialization
162.       // TWI disabled
163.       TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);
164.
```

```
165.       while (1)
166.             {
167.             cn=(read_adc(0)*50)/255;
168.             decenas=cn/10;
169.             unidades=cn%10;
170.
171.             PORTB=tab7seg[decenas];
172.             C0=0;
173.             C1=1;
174.             delay_ms(1);
175.
176.
177.             PORTB=tab7seg[unidades];
178.             C0=1;
179.             C1=0;
180.             delay_ms(1);
181.
182.             }
183.       }
```