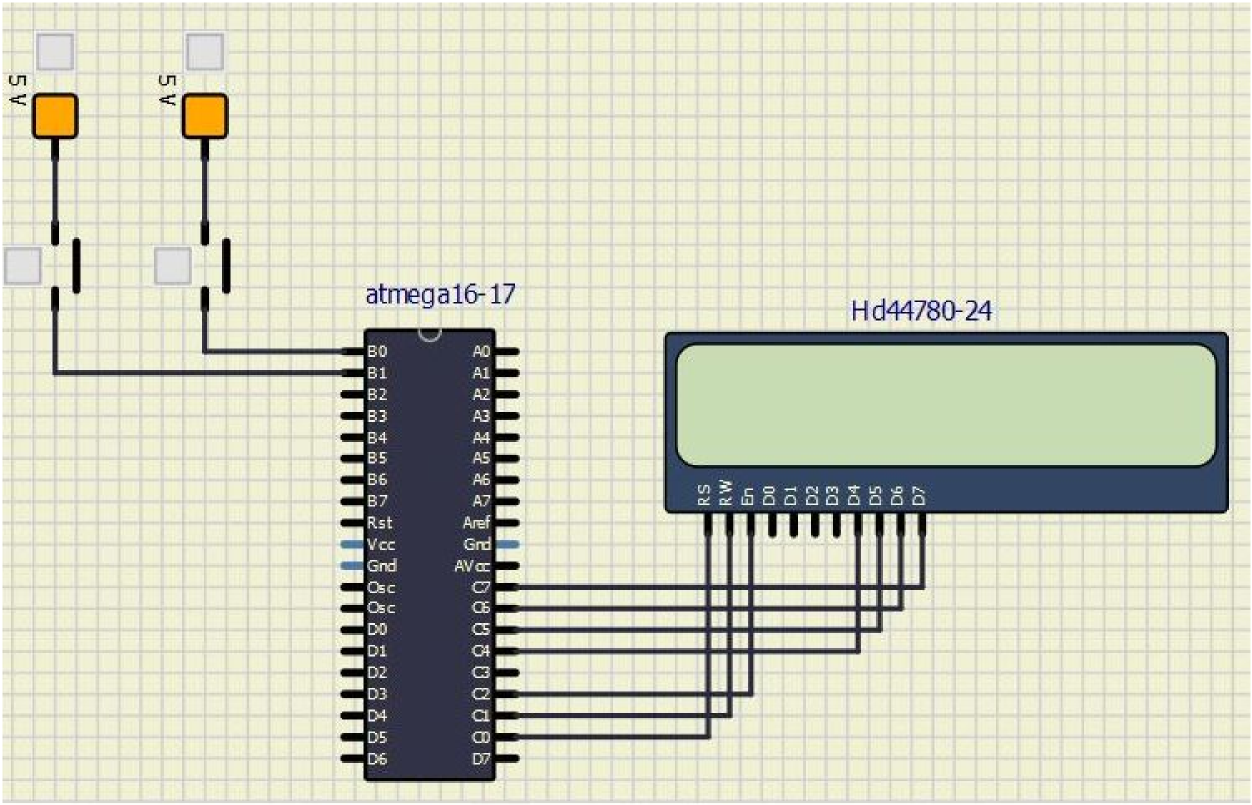
Projeto Intermediário - 4 - Controle de Botões e Exibição de dados no LCD

Tutorial:

Componentes

2 Tensão Fixa 5v
2 Botão
1 Tela LCD
1 Microcontrolador Atmega16

Simulação Software SimulIDE



Montagem do Projeto no SimulIDE

Conexões dos componentes:

Botão 1	Porta BO
Botão 2	Porta B1

Conexões Tela LCD	
RS	PORTA C0
RW	PORTA C1
En	PORTA C2
D4	PORTA C4
D5	PORTA C5
D6	PORTA C6
D7	PORTA C7

<u>Programação em C Software CODEVision</u>

Bibliotecas utilizadas:

<stdio.h>
<delay.h>
<mega16.h>
<alcd.h>

```
/*******************
This program was created by the CodeWizardAVR V3.43
Automatic Program Generator
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Project :
Version :
Date    : 06/03/2021
Author  :
Company :
Comments:
```

```
Chip type              : ATmega16
Program type           : Application
AVR Core Clock frequency: 14,745600 MHz
Memory model           : Small
External RAM size      : 0
Data Stack size        : 256
*******************/

#include <mega16.h>
#include <delay.h>

// Alphanumeric LCD functions
#include <alcd.h>

// Declare your global variables here

    int cont;
    char lotacao[33];
    char aviso[33];

// Standard Input/Output functions
#include <stdio.h>

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

    cont = 0;


// 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=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
DDRB=(0<<DDB7) | (0<<DDB6) | (0<<DDB5) | (0<<DDB4) | (0<<DDB3) | (0<<DDB2) |
(0<<DDB1) | (0<<DDB0);
```

```
// State: Bit7=T Bit6=T Bit5=T Bit4=T Bit3=T Bit2=T Bit1=T Bit0=T
PORTB=(0<<PORTB7) | (0<<PORTB6) | (0<<PORTB5) | (0<<PORTB4) | (0<<PORTB3) |
(0<<PORTB2) | (0<<PORTB1) | (0<<PORTB0);

// Port C initialization
// Function: Bit7=In Bit6=In Bit5=In Bit4=In Bit3=In Bit2=In Bit1=In Bit0=In
DDRC=(0<<DDC7) | (0<<DDC6) | (0<<DDC5) | (0<<DDC4) | (0<<DDC3) | (0<<DDC2) |
(0<<DDC1) | (0<<DDC0);
// State: Bit7=T Bit6=T Bit5=T Bit4=T Bit3=T Bit2=T Bit1=T Bit0=T
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;
TCNT1L=0x00;
ICR1H=0x00;
ICR1L=0x00;
OCR1AH=0x00;
OCR1AL=0x00;
OCR1BH=0x00;
OCR1BL=0x00;

// Timer/Counter 2 initialization
// Clock source: System Clock
// Clock value: Timer2 Stopped
// Mode: Normal top=0xFF
// OC2 output: Disconnected
ASSR=0<<AS2;
TCCR2=(0<<PWM2) | (0<<COM21) | (0<<COM20) | (0<<CTC2) | (0<<CS22) | (0<<CS21) |
(0<<CS20);
TCNT2=0x00;
OCR2=0x00;

// Timer(s)/Counter(s) Interrupt(s) initialization
TIMSK=(0<<OCIE2) | (0<<TOIE2) | (0<<TICIE1) | (0<<OCIE1A) | (0<<OCIE1B) | (0<<TOIE1) |
(0<<OCIE0) | (0<<TOIE0);

// External Interrupt(s) initialization
// INT0: Off
// INT1: Off
// INT2: Off
MCUCR=(0<<ISC11) | (0<<ISC10) | (0<<ISC01) | (0<<ISC00);
MCUCSR=(0<<ISC2);

// USART initialization
// Communication Parameters: 8 Data, 1 Stop, No Parity
// USART Receiver: On
// USART Transmitter: On
// USART Mode: Asynchronous
// USART Baud Rate: 9600
UCSRA=(0<<RXC) | (0<<TXC) | (0<<UDRE) | (0<<FE) | (0<<DOR) | (0<<UPE) | (0<<U2X) |
(0<<MPCM);
```

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UCSRB=(0<<RXCIE) | (0<<TXCIE) | (0<<UDRIE) | (1<<RXEN) | (1<<TXEN) | (0<<UCSZ2) |
(0<<RXB8) | (0<<TXB8);
UCSRC=(1<<URSEL) | (0<<UMSEL) | (0<<UPM1) | (0<<UPM0) | (0<<USBS) | (1<<UCSZ1) |
(1<<UCSZ0) | (0<<UCPOL);
UBRRH=0x00;
UBRRL=0x5F;

// Analog Comparator initialization
// Analog Comparator: Off
// The Analog Comparator's positive input is
// connected to the AIN0 pin
// The Analog Comparator's negative input is
// connected to the AIN1 pin
ACSR=(1<<ACD) | (0<<ACBG) | (0<<ACO) | (0<<ACI) | (0<<ACIE) | (0<<ACIC) | (0<<ACIS1) |
(0<<ACIS0);
SFIOR=(0<<ACME);

// ADC initialization
// ADC disabled
ADCSRA=(0<<ADEN) | (0<<ADSC) | (0<<ADATE) | (0<<ADIF) | (0<<ADIE) | (0<<ADPS2) |
(0<<ADPS1) | (0<<ADPS0);

// SPI initialization
// SPI disabled
SPCR=(0<<SPIE) | (0<<SPE) | (0<<DORD) | (0<<MSTR) | (0<<CPOL) | (0<<CPHA) |
(0<<SPR1) | (0<<SPR0);

// TWI initialization
// TWI disabled
TWCR=(0<<TWEA) | (0<<TWSTA) | (0<<TWSTO) | (0<<TWEN) | (0<<TWIE);

// Alphanumeric LCD initialization
// Connections are specified in the
// Project|Configure|C Compiler|Libraries|Alphanumeric LCD menu:
// RS: PORTC Bit 0
// RD: PORTC Bit 1
// EN: PORTC Bit 2
// D4: PORTC Bit 4
// D5: PORTC Bit 5
// D6: PORTC Bit 6
// D7: PORTC Bit 7
// Characters/line: 16
lcd_init(16);
```

```
while (1)
      {
      if (PINB.0)
      {
          cont = cont + 1;
          printf("Numero de pessoas no interior: = %d.\r\n",cont);

      };
      delay_ms(400);

      if (PINB.1)
      {
        if(cont == 0)
        {
          printf("Ambiente vazio \r\n");
          }

          else
          {
         cont = cont - 1;
         printf("Numero de pessoas no interior: = %d.\r\n",cont);
         }


      };
      delay_ms(400);

       if (cont == 0 )
            {
              sprintf(aviso,"AMBIENTE VAZIO");
              lcd_clear();
              lcd_puts(aviso);
            };


         if (cont == 4)
         {
            sprintf(aviso,"MANTER DISTANCIA");
            lcd_clear();
            lcd_puts(aviso);
         };
         if (cont == 8)
            {
              sprintf(aviso,"CAPACIDADE MAX");
              lcd_clear();
              lcd_puts(aviso);
            };


            if (cont >= 9)
            {
              sprintf(aviso,"FAVOR RETIRAR-SE");
              lcd_clear();
              lcd_puts(aviso);
            };



             lcd_gotoxy(7,1);
             sprintf(lotacao,"%d", cont);
             lcd_puts(lotacao);


      }
}
```