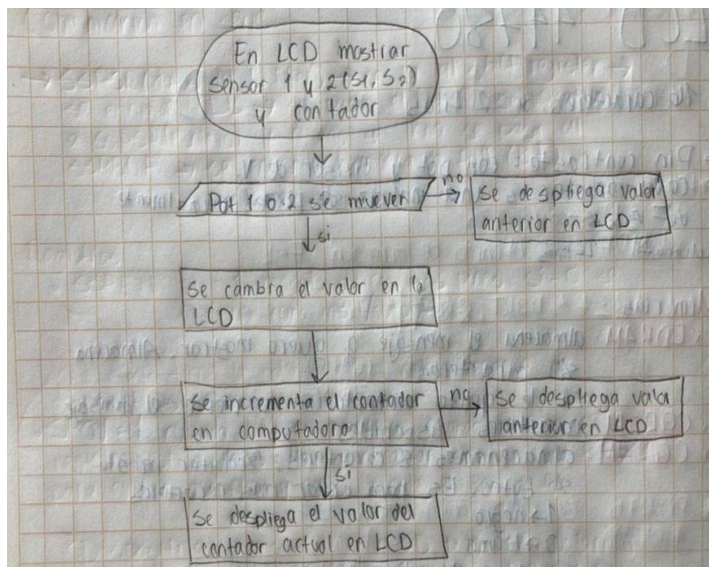


Laboratorio # 3

Diagrama de flujo



Código documentado

Main

MPLAB X IDE v5.45 - Lab3: default

File Edit View Navigate Source Refactor Production Debug Team Tools Window Help

default zdc.c: W:0x0:bank 0 How do I? [keyword]

Proj... Files

Lab3

Header Files

Linker Files

Source Files

ADC.c

LCD.c

main.c

UART.c

Libraries

Loadables

Classes

main.c

```
1 /*
2  * File: main.c
3  * Author: Nicole Prem 18337
4  * LAB 3
5  *
6  * Created on 4 de febrero de 2021, 06:00 PM
7  */
8
9 //*****
10 //Configuración de palabra
11 //*****
12 #pragma config FOSC = INTRC_CLKOUT // Oscillator Selection bits (INTOSC oscillator: CLKOUT function on RA4/OSC2/CLKOUT pin, I/O function on RA7/OSC1/CLKIN)
13 #pragma config WDTE = OFF // Watchdog Timer Enable bit (WDT disabled and can be enabled by SWDTEN bit of the WDTCON register)
14 #pragma config FWDT = OFF // Power-up Timer Enable bit (PWRT disabled)
15 #pragma config MCLRE = OFF // RE3/MCLR pin function select bit (RE3/MCLR pin function is digital input, MCLR internally tied to VDD)
16 #pragma config CP = OFF // Code Protection bit (Program memory code protection is disabled)
17 #pragma config CPD = OFF // Data Code Protection bit (Data memory code protection is disabled)
18 #pragma config BOREN = OFF // Brown Out Reset Selection bits (BOR disabled)
19 #pragma config IESO = OFF // Internal External Switchover bit (Internal/External Switchover mode is disabled)
20 #pragma config FCMEN = OFF // Fail-Safe Clock Monitor Enabled bit (Fail-Safe Clock Monitor is disabled)
21 #pragma config LVP = OFF // Low Voltage Programming Enable bit (RB3 pin has digital I/O, HV on MCLR must be used for programming)
22
23 // CONFIG2
24 #pragma config BOR4V = BOR40V // Brown-out Reset Selection bit (Brown-out Reset set to 4.0V)
25 #pragma config WRT = OFF // Flash Program Memory Self Write Enable bits (Write protection off)
26
27 // #pragma config statements should precede project file includes.
28 // Use project enums instead of #define for ON and OFF.
29 #include <xc.h>
30 #include <xcstdint.h>
31 #include <stdio.h> //Libreria para usar printf
32 #include "LCD.h"
33 #include "ADC.h"
34 #include "UART.h"
35 #define _XTAL_FREQ 8000000
36
37 //*****
```

Configuration Bits Output

126:45 IN5

Escribe aquí para buscar

01:59 p.m. 11/02/2021

MPLAB X IDE v5.45 - Lab3: default

File Edit View Navigate Source Refactor Production Debug Team Tools Window Help

default zdc.c: W:0x0:bank 0 How do I? [keyword]

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main.c

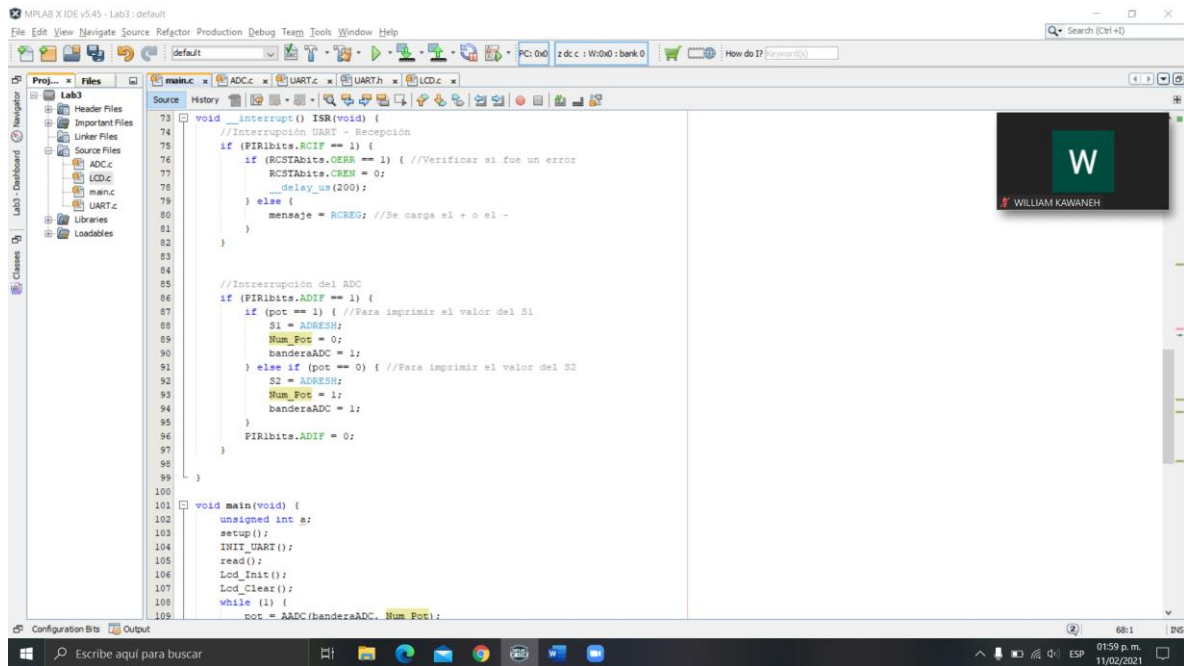
```
37 //*****
38 //Variables
39 //*****
40 uint8_t S1; //Variable para guardar valor del sensor 1
41 uint8_t S2; //Variable para guardar valor del sensor 1
42 uint8_t banderaADC = 1; //bandera del ADC
43 uint8_t adc;
44 uint8_t pot; //bandera para determinar cuál valor de los pots se mostrará
45 uint8_t sum_pot = 1; //
46 uint8_t mensaje;
47 uint8_t contador = 0;
48
49 double conversor;
50 char s[20];
51
52
53
54 //*****
55 //Declaración de entradas, salidas y limpieza de puertos
56 //*****
57
58 void setup(void) {
59     ANSEL = 0b00000011; //Entrada analógica
60     //ANSEL = 0; //Entrada analógica
61     TRISA = 0b00000000;
62     TRISB = 0b00000000;
63     //limpieza de puertos
64     PORTB = 0;
65     PORTD = 0;
66     //PORTA = 0;
67
68
69 //*****
70 //Interrupciones
71 //*****
72
73 void interrupt() ISR(void) {
```

Configuration Bits Output

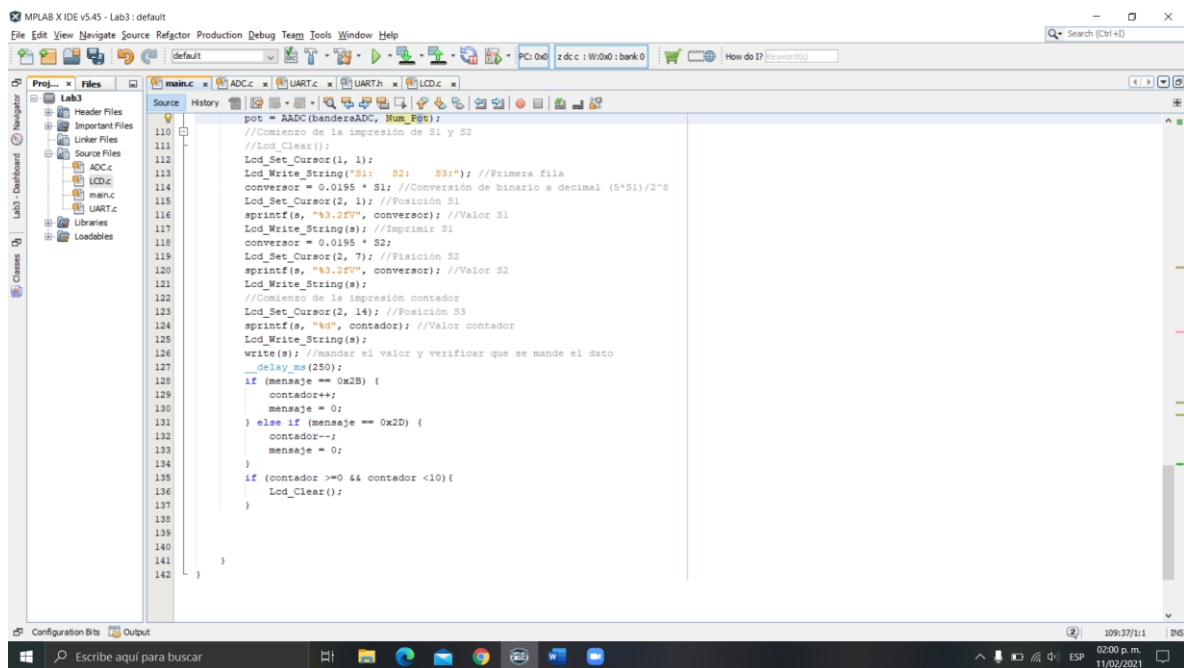
67:4 IN5

Escribe aquí para buscar

01:59 p.m. 11/02/2021



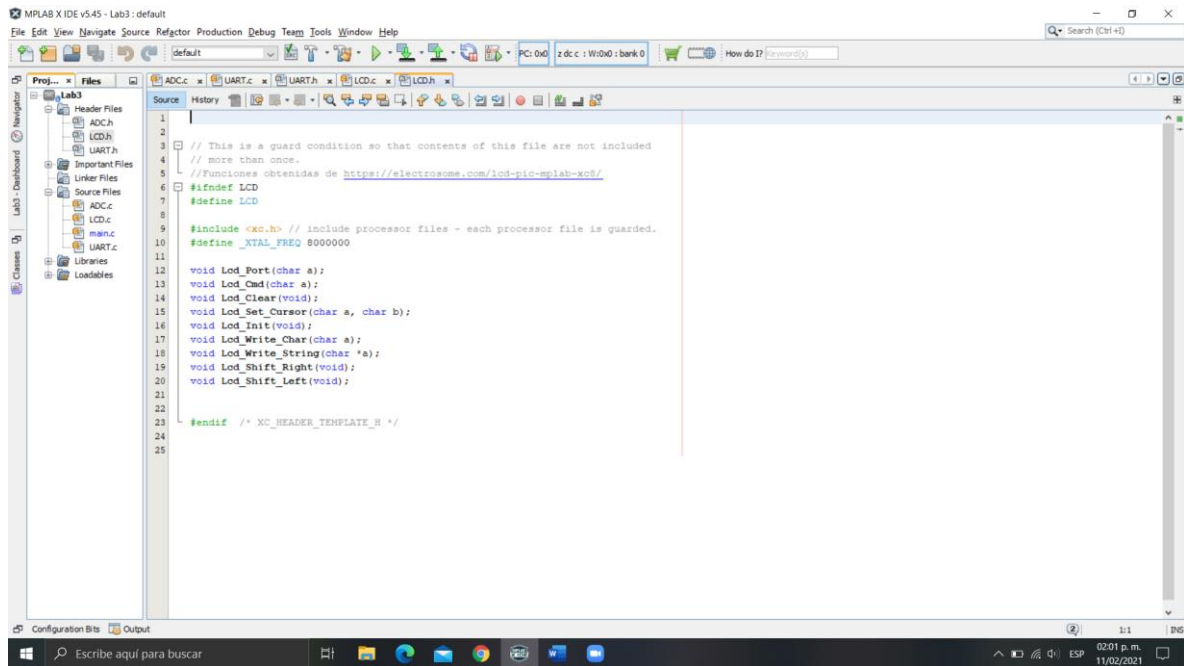
```
173 void __interrupt() ISR(void) {
174     //Interrupción UART - Recepción
175     if (PIRbits.RCIF == 1) {
176         if (RCSTAbits.OERR == 1) { //Verificar si fue un error
177             RCSTAbits.CREN = 0;
178             _delay_us(200);
179         } else {
180             mensaje = RCREG; //Se carga el + o el -
181         }
182     }
183 }
184
185 //Interrupción del ADC
186 if (PIRbits.ADIF == 1) {
187     if (pot == 1) { //Para imprimir el valor del S1
188         S1 = ADRESH;
189         Num_Pot = 0;
190         banderaADC = 1;
191     } else if (pot == 0) { //Para imprimir el valor del S2
192         S2 = ADRESH;
193         Num_Pot = 1;
194         banderaADC = 1;
195     }
196     PIRbits.ADIF = 0;
197 }
198 }
199
200 void main(void) {
201     unsigned int a;
202     setup();
203     INIT_UART();
204     read();
205     Lcd_Init();
206     Lcd_Clear();
207     while (1) {
208         pot = AADC(banderaADC, Num_Pot);
```



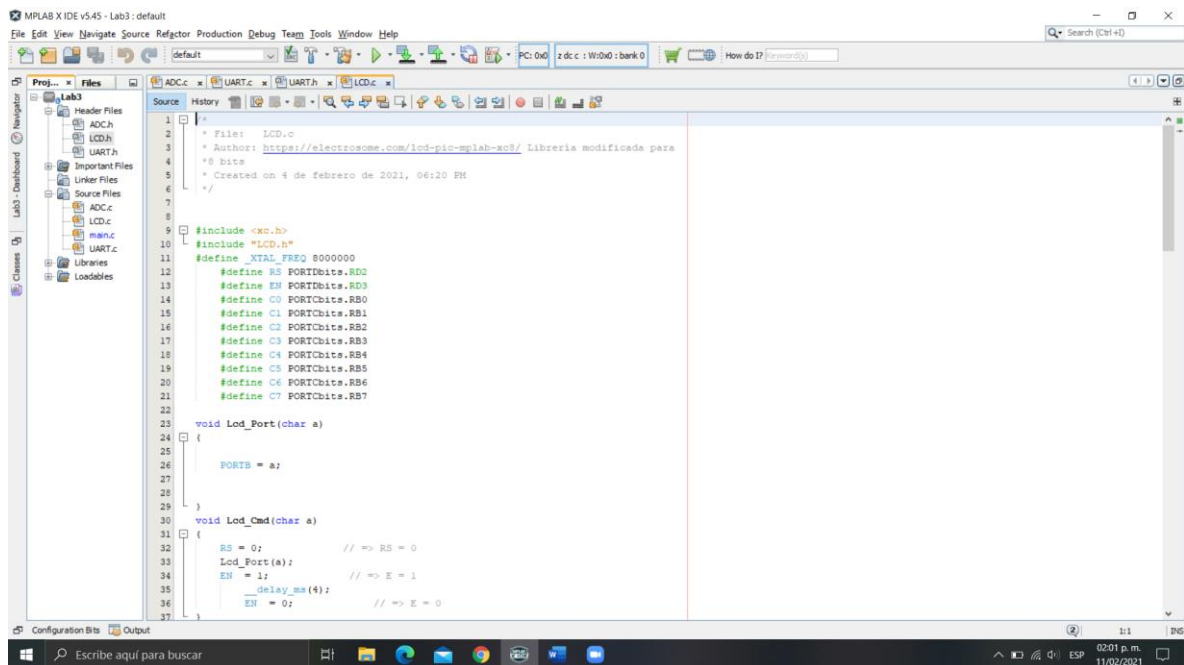
```
210 pot = AADC(banderaADC, Num_Pot);
211 //Comienzo de la impresión de S1 y S2
212 Lcd_Clear();
213 Lcd_Set_Cursor(1, 1);
214 Lcd_Write_String("S1: S2: S3:"); //Primera fila
215 conversor = 0.0195 * S1; //Conversión de binario a decimal (5*S1)/2^8
216 Lcd_Set_Cursor(2, 1); //Posición S1
217 sprintf(s, "%3.2fV", conversor); //Valor S1
218 Lcd_Write_String(s); //Imprimir S1
219 conversor = 0.0195 * S2;
220 Lcd_Set_Cursor(2, 7); //Posición S2
221 sprintf(s, "%3.2fV", conversor); //Valor S2
222 Lcd_Write_String(s);
223 //Comienzo de la impresión contador
224 Lcd_Set_Cursor(2, 14); //Posición S3
225 sprintf(s, "%d", contador); //Valor contador
226 Lcd_Write_String(s);
227 write(s); //mandar el valor y verificar que se mande el dato
228 _delay_ms(250);
229 if (mensaje == 0x2B) {
230     contador++;
231     mensaje = 0;
232 } else if (mensaje == 0x2D) {
233     contador--;
234     mensaje = 0;
235 }
236 if (contador >= 0 && contador < 10) {
237     Lcd_Clear();
238 }
239 }
240 }
241 }
242 }
```

LCD

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Source file



MPLAB X IDE v5.45 - Lab3: default

File Edit View Navigate Source Refactor Production Debug Team Tools Window Help

default PC: 0x0 zdc: W:0x0: bank 0 How do I? [keyword]

Proj... x Files

Lab3

- Header Files
 - ADC.h
 - LCD.h
 - UART.h
- Important Files
 - Linker Files
 - Source Files
 - ADC.c
 - LCD.c
 - main.c
 - UART.c
 - Libraries
 - Loadables

Classes

```
31 {
40 {
41   Lcd_Cmd(0);
42   Lcd_Cmd(1);
43 }
44
45 void Lcd_Set_Cursor(char a, char b)
46 {
47   char temp,z,y;
48   if(a == 1)
49   {
50     temp = 0x00 + b - 1;
51     // z = temp >> 4;
52     y = temp & 0x0F;
53     // Lcd_Cmd(8);
54     // Lcd_Cmd(y);
55     Lcd_Cmd(temp);
56   }
57   else if(a == 2)
58   {
59     temp = 0x00 + b - 1;
60     // z = temp >> 4;
61     y = temp & 0x0F;
62     // Lcd_Cmd(8);
63     // Lcd_Cmd(y);
64     Lcd_Cmd(temp);
65   }
66 }
67
68 void Lcd_Init(void)
69 {
70   Lcd_Port(0x00);
71   _delay_us(20);
72   Lcd_Cmd(0x3F);
73   _delay_us(10);
74   Lcd_Cmd(0x3F);
75   _delay_us(200);
76   Lcd_Cmd(0x3F);
77 }
```

Configuration Bits Output

37:2 IN5

Escribe aquí para buscar

02:01 p.m. 11/02/2021

MPLAB X IDE v5.45 - Lab3: default

File Edit View Navigate Source Refactor Production Debug Team Tools Window Help

default PC: 0x0 zdc: W:0x0: bank 0 How do I? [keyword]

Proj... x Files

Lab3

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Classes

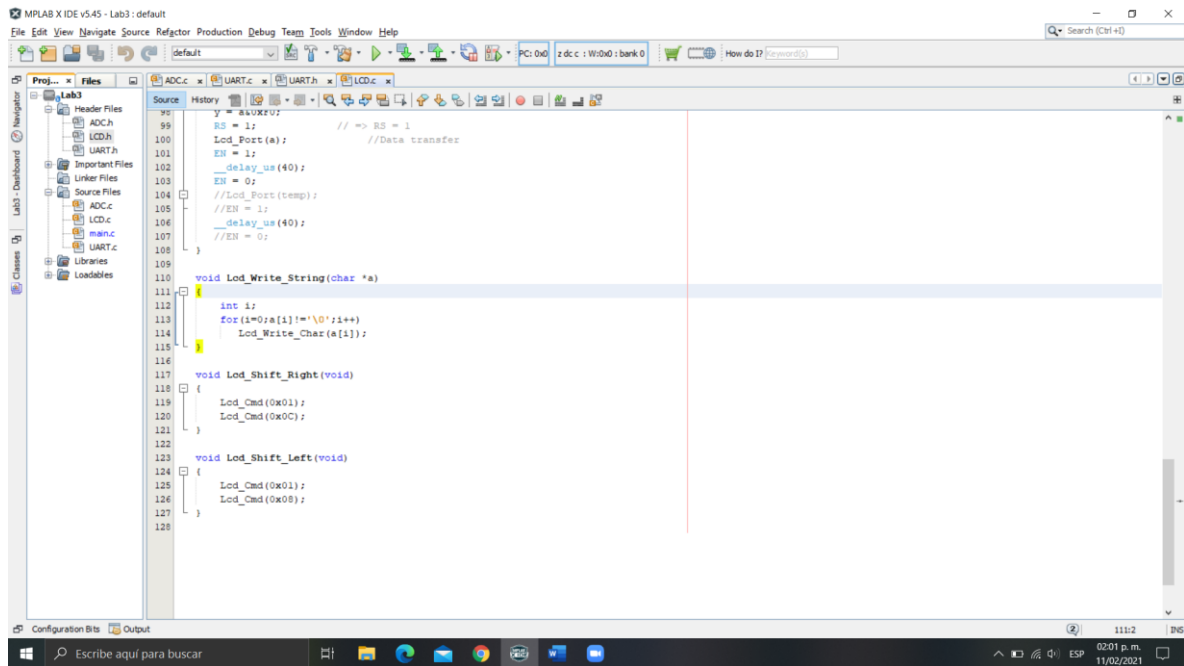
```
76 Lcd_Cmd(0x3F);
77 // _delay_us(200);
78 Lcd_Cmd(0x32); //Set interface lenght 0b00000010
79 Lcd_Cmd(0x38); // 00111000
80 Lcd_Cmd(0x0C); // 00001100
81 Lcd_Cmd(0x06); //Set cursor move direction últimos 2 no estoy segura 0b00000110
82 // Lcd_Cmd(0b00000110); //Enable display/cursor últimos 3 no estoy segura
83
84 ///////////////////////////////////////////////////
85 // Lcd_Cmd(0x03);
86 // Lcd_Cmd(0x02);
87 // Lcd_Cmd(0x08);
88 // Lcd_Cmd(0x00);
89 // Lcd_Cmd(0x0C);
90 // Lcd_Cmd(0x00);
91 // Lcd_Cmd(0x04);
92 }
93
94 void Lcd_Write_Char(char a)
95 {
96   char temp,y;
97   temp = a < 0x0F;
98   y = a < 0xF0;
99   RS = 1; // => RS = 1
100   Lcd_Port(a); //Data transfer
101   EN = 1;
102   _delay_us(40);
103   EN = 0;
104   //Lcd_Port(temp);
105   //EN = 1;
106   _delay_us(40);
107   //EN = 0;
108 }
109
110 void Lcd_Write_String(char *a)
111 {
112   int i;
```

Configuration Bits Output

76:17 IN5

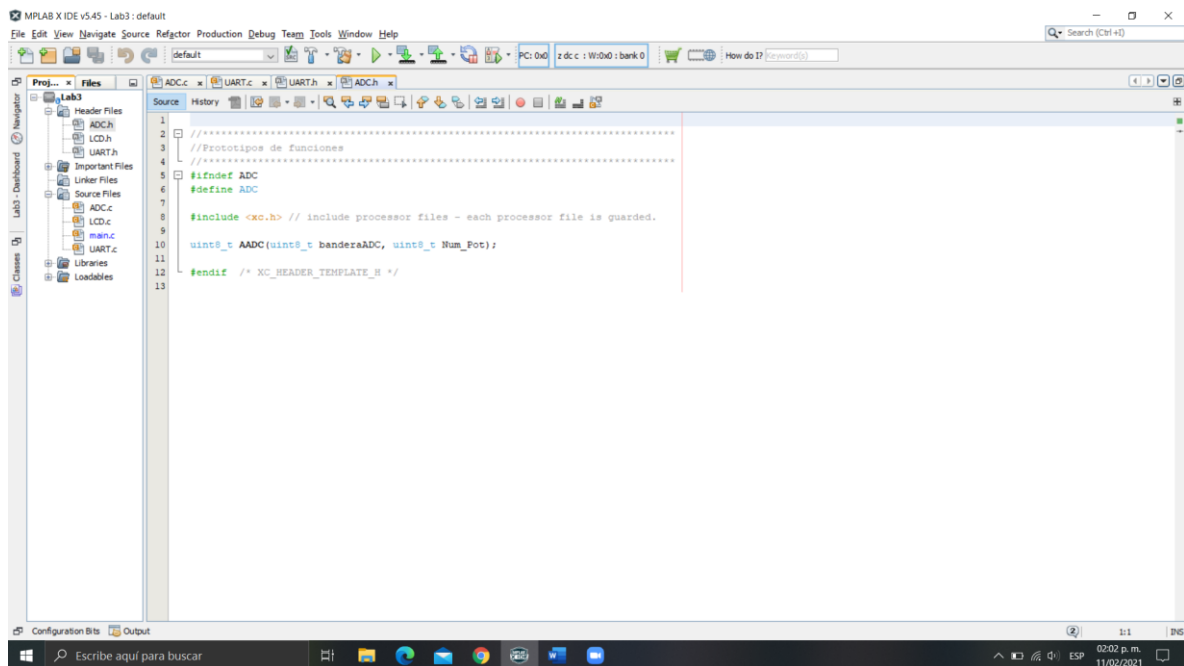
Escribe aquí para buscar

02:01 p.m. 11/02/2021

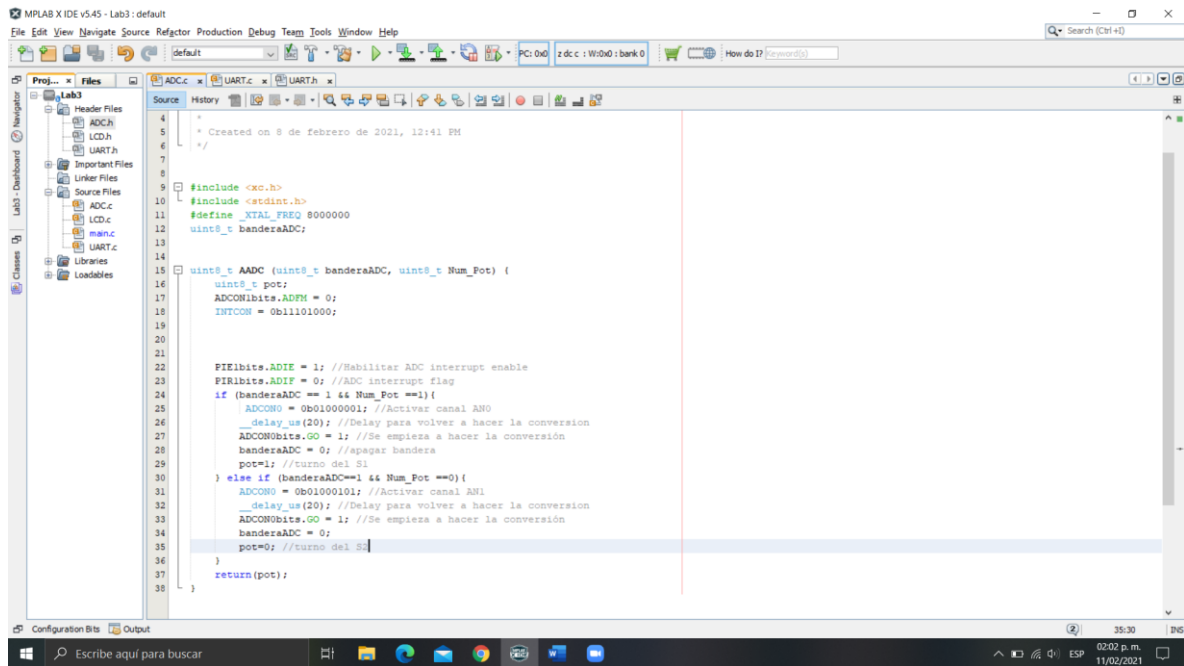


ADC

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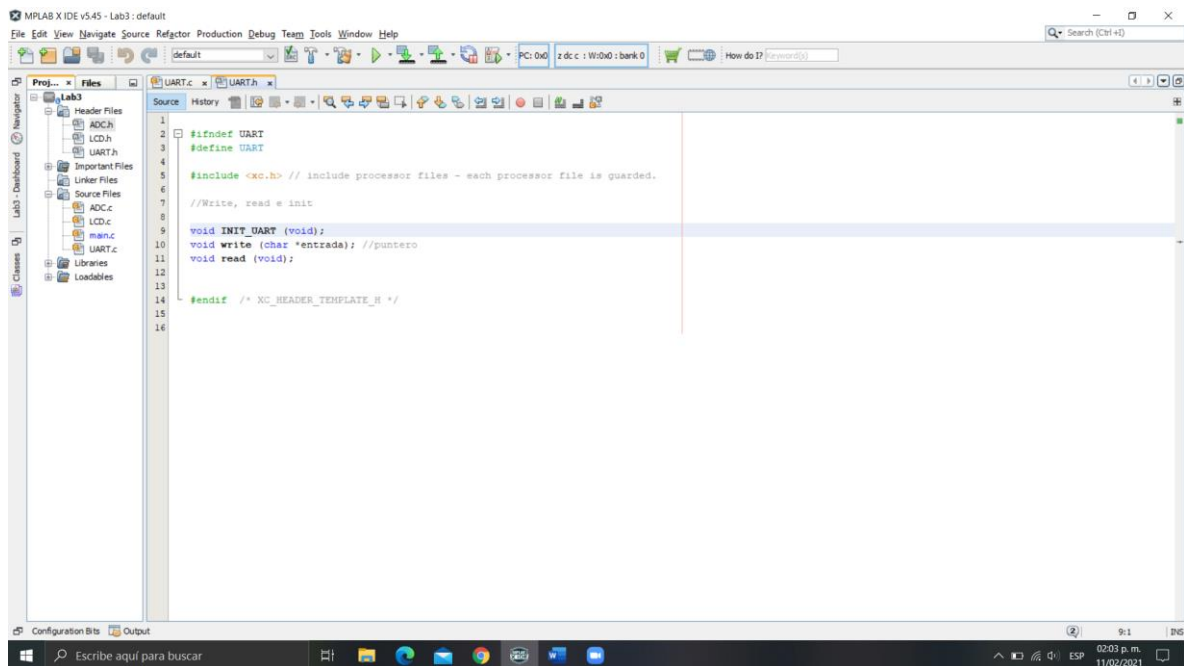


Source file



Comunicación UART

Archivo Heather



Source file


```
1  /*  
2  * File:   UART.c  
3  * Author: Nicole Prem  
4  * Created on 9 de febrero de 2021, 09:42 PM  
5  */  
6  
7  
8  
9  #include <xc.h>  
10 #define XTAL_FREQ 8000000  
11  
12 void INIT_UART(void) {  
13     TRISC = 0b10000000;  
14     TXSTABits.SPEN = 1;  
15     RCSTABits.SPEN = 1; //Habilitar interrupción del receptor  
16     PIRbits.RCIE = 1; //Habilitar interrupciones globales  
17     INTCONbits.GIE = 1; //Velocidad de transmisión lenta  
18     TXSTABits.BRGW = 0; //Boundgate de 16 bits  
19     BAUDCTLbits.BRG16 = 1; //Activación transmisión  
20     TXSTABits.TXEN = 1; //Boundgate de 16 bits  
21     SPBRG = 25; //19230bps  
22 }  
23  
24 void write (char *entrada) { //función para el contador de 4 bits de ancho  
25     TXREG = entrada[0]; //bit 1  
26     while (TRMT == 0) {  
27     }  
28     TXREG = entrada[1]; //bit 2  
29     while (TRMT == 0) {  
30     }  
31     TXREG = entrada[2]; //bit 3  
32     while (TRMT == 0) {  
33     }  
34     TXREG = entrada[3]; //bit 4  
35     while (TRMT == 0) {  
36     }  
37     TXREG = 0x20;  
38 }
```

```
39  
40 //puntero  
41 void read (void) {  
42     RCSTABits.CREN = 1;  
43     RCSTABits.PERR = 0;  
44     PIRbits.RCIE = 1;  
45     RCSTABits.OEER = 0;  
46 }  
47
```

Link del repositorio de GitHub

<https://github.com/nicoleprem/Digital-2.git>