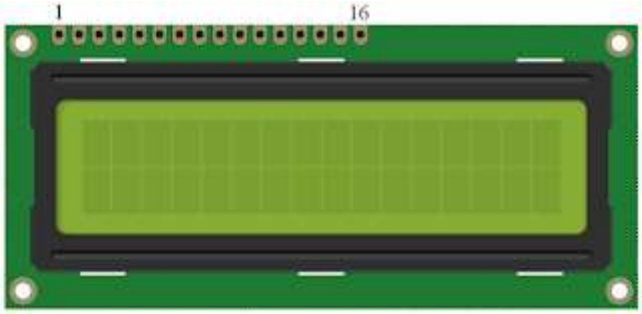
July 28, 2017 - 8051

Interfacing LCD with 8051 using Keil C – AT89C51

LCD Interfacing-8051 AT89C51xD2

Introduction:



A **16*2** Alphanumeric display with backlight is provided on Evaluation Board.

Liquid Crystal Display (LCD) is widely used electronic display module and having a wide range of applications such as calculators, laptops, mobile phones etc.

LCD in ALS 8051 Evaluation Board is connected to Port P2. Before we initialise the LCD Let us understand some basic

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concepts of LCD.

1)LCD Pin Descriptions:

Normally LCD has 16 pins. The function of each pin is discussed below in the table.

Pin	Symbol	Input/output	Details
1	Vss	-	GND
2	Vcc	-	+5V
3	Vee	-	Contrast Control
4	RS	Input	RS=0 Command Register RS=1 Data Register
5	R/W	Input	R/W=0 for Write R/W=1 for Read
6	EN	Input/output	Enable
7	DB0	Input/output	8 bit data bus
8	DB1	Input/output	8 bit data bus
9	DB2	Input/output	8 bit data bus
10	DB3	Input/output	8 bit data bus
11	DB4	Input/output	8 bit data bus
12	DB5	Input/output	8 bit data bus
13	DB6	Input/output	8 bit data bus
14	DB7	Input/output	8 bit data bus
15	LED+	-	Backlight of LCD to VCC
16	LED-	-	Backlight of LCD to GND

Table 1.1 Pin description of LCD

2) RS (Register Select):

The RS pin is used to select command code register or data register. If RS=0 the command code register is selected which allows us to send the instructions to LCD. If RS=1 the data register is selected which allows us to send data to be displayed o LCD.

3) RW(Read/Write):

R/W input allows the user to write information to the LCD or read info from it.
R/W =1 when reading
R/W =0 when writing

4) EN (Enable):

when data or command is sent to LCD a high-to-low pulse must applied to the PIN. So Enable pin is toggled by sending first 1 and then 0.

5) LCD Commands:

- Introduction to Python Programming

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LCD Commands sent to LCD are given in table below with description of each command.

Sl.No	Details	Hex Number	Decimal
1	FS: 8 bit 1st line 5x7 Dots	0x30	48
2	FS: 8 bit 2nd line 5x7 Dots	0x38	56
3	FS: 4 bit 1st line 5x7 Dots	0x20	32
4	FS: 4 bit 2nd line 5x7 Dots	0x28	40
5	Entry Mode	0x06	6
6	Display off cursor off	0x08	8
7	Display on cursor on	0x0E	14
8	Display on cursor off	0x0C	12
9	Display on cursor blinking	0x0F	15
10	LCD Clear	0x01	1

FS: Function Set

Table1.2 LCD Commands

Now let us see the Code

CODE :

```
#include <reg51.h>
#define display_port P2      //Data pins
connected to port 2 on microcontroller
void delay(int);
void lcd_comm(void);
void lcd_data(void);
void lcd_init(void);
void lcd_clear(void);


unsigned char temp1,temp2,var,j;
unsigned char
*ptr,disp1[]="CodesExplorer",disp2[]="LC
D Interfacing";
sbit RS=P2^7;
//RS pin connected to pin 7 of port 2
sbit EN=P2^6;
//E pin connected to pin 6 of port 2
sbit RW=P2^5;
//RW pin connected to pin 5 of port 2

int main()
```

```
{
        lcd_init();
//lcd intialisation
        delay(100);
        lcd_clear();
//clear display
        delay(100);
        while(1)
        {
                temp1=0x80;
// Display Starting address of first
line
                lcd_comm();
                delay(50000);

                ptr=disp1;
                while(*ptr!='\0')
// searching the null terminator in the
sentence
                {
                        temp2=*ptr;
                        lcd_data();
                        ptr ++;
                        delay(50000);
                }

                temp1 = 0xC0;
// Display starting address of second
line 1st pos
                lcd_comm();
                delay(50000);

                ptr=disp2;
                while(*ptr!='\0')
// searching the null terminator in the
sentence
                {
                        temp2=*ptr;
                        lcd_data();
                        ptr ++;
```

```
                        delay(50000);
                }

                temp1=0x01;
                lcd_comm();
                delay(2000);
        }
}

void lcd_init()
{
        unsigned int cmd[]=
{0x20,0x28,0x0e,0x06,0x80,0x01};
        unsigned int i;
        for(i=0;i<7;i++)
        {
                temp1=cmd[i];
                lcd_comm();
                delay(500);
        }
}

void lcd_comm()
/Function to send command instruction to
LCD
{
        var=temp1;
        temp1=temp1&0x0F0;
        temp1=temp1>>4;
        display_port=temp1;
        RS=0;
        EN=1;
        EN=0;
        temp1=var&0x0F;
        display_port=temp1;
        RS=0;
        EN=1;
        EN=0;
        delay(60);
}
```

```
void lcd_data()
//Function to send display data to LCD
{
        var=temp2;
        temp2=temp2&0x0F0;
        temp2=temp2>>4;
        display_port=temp2;
        RS=1;
        EN=1;
        EN=0;
        temp2=var&0x0F;
        display_port=temp2;
        RS=1;
        EN=1;
        EN=0;
        delay(600);
}

void lcd_clear(void)
{
    temp1 = 0x01;
    lcd_comm();
    delay(500);
}

void delay(int j)
{
        unsigned int i;
        for(i=0;i<j;i++);
}
```

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